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ABSTRACT

This publication contains the proceedings of the first conference on Science and Social Issues, which was devoted to the topic of world population. Speeches are divided into two major groups: (1) population and the environment, the natural science view; and (2) population and society, the social view. Topics include population and natural resources, economic development, ethical values, and political systems. A brief listing of references is included at the end of each speech, as well as transcripts of the question and answer sessions. A general session on population education and a speech by Barry Commoner conclude the book. (MA)

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World Population Conference

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NEW BRUNSWICK, N. J.

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New Jersey Department of Education –
Rutgers University
Joint Environmental Education Project

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FOREWORD

Commenting upon the rapid rate of change of contemporary life often becomes redundant. In a relatively recent book, Future Shock, Alvin Toffler considers the impact of accelerated change on people. In one sense, the message in this widely read book is quite clear. The real impact of Toffler's argument, however, lies in the fact that the examples used were themselves outdated shortly after the book was published. Over the years, such change, whether responsible or not, has been accompanied by a growing public awareness and consciousness of many complex social problems. Increasing crime, urban congestion, energy shortages, and environmental degradation are but a few of the problems that could be elaborated upon at length.

The expansion and influence of science can be closely coupled with this period of change. Near the end of World War II, Vannevar Bush argued that a dynamic society must be supported in its evolution by a flourishing science. Unprecendented public support of science led to a richly productive period, placing the United States in the forefront of many fields of research. This knowledge, however, seemed to generate a number of difficult questions related to such areas as genetics, fetal research, biological warfare, and the effects of low-dose radiation. We began to recognize that the gifts of science were frequently accompanied by unanticipated consequences, some of which confronted mankind with awkward and difficult choices. Some talked of the danger of uncontrolled science and its disruptive influences. In the more common vernacular science became associated in the minds of many with war and environmental pollution.

In another sense the classic question of knowledge and purpose is once again being raised. The C.P. Snow "Two Cultures" thesis can be extended in describing the conflicts that exist between the culture of an advancing science and the more classical tradition. Alexander Solzhenitsyn speaks for many when he proposes that we forsake the advantages of progress for a simpler way of life, one in which man's spiritual identity is dominant. In contrast, Farah Pahlavi, Empress of Iran, recently pointed to the chasm that exists between an advancing scientific culture and the spiritual tradition. Speaking for the underdeveloped nations, she has called for a massive educational program to extend knowledge and the spirit of science to narrow this chasm. It would seem that our previous quest of knowledge for the sake of knowledge is being replaced by the more difficult question of knowledge for what purpose.

The public is increasingly recognizing its stake and responsibility in dealing with problems which range from population control to installation of fast breeder reactors. Such problems cannot be resolved by knowledge alone. It makes little sense to think that experts can be employed to eliminate all of our most pressing problems. Knowledge can at best illuminate possible alternative choices, but in itself is incapable of making the choice. Then too, we have learned that solutions themselves bear additional problems. What seems called for is broader public participation in providing directions to the goals for knowledge, which in turn can be used to anticipate consequences and alternate possibilities in considering the direction that we choose to give our energies and subsequently our way of life.

Education indeed has a vital role in such a period. The gulf between science and popular understanding must be narrowed. Even more critical is the question of content. How is knowledge to be organized and presented so that it can be utilized to deal with the problems that confront us. This obviously is not a question that can be resolved easily. Schools have not classically participated in thinking through such problems. The response traditionally has involved adopting a new curriculum. Packaged curricula as such may be unable to address such problems. What may be called for is greater involvement of teachers in considering such questions and possible educational responses to the problems.

Such was the spirit that led to the organization of the first conference on Science and Social Issues which was devoted to "Population." This is an issue that in some form is on everyone's mind. Hardly a day passes when some aspect of the problem is not discussed in the popular press. It seemed that a problem of such magnitude should be considered by selected teachers in the state, college and university personnel, and national experts. Discussion of issues such as population would help identify and clarify critical factors and approaches that could be used in addressing such an issue. Teachers could then return to their school with this recent knowledge, and with alternate educational strategies deal with this problem in their local communities. Successful techniques and practices could then be shared in a statewide network of teachers and researchers interested

in the problem. Additional conferences and follow-up activities such as those mentioned above are planned for the future. It is our contention that such a process could do much to vitalize education in this period of unprecedented change.

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Fred G. Burke

I think it is a particularly appropriate time for a conference of this sort, in part because it is the World Population Year, and most of us have had it brought home to us rather dramatically that there is a critical relationship between both the number of mouths that have to be fed on this planet and the food that is available to feed them, and the distribution and allocation of those people and that food. I think education has a critical role to play as we contemplate these problems.

My remarks on this subject will be general and range widely. I will talk about the role of education in possible solutions to the population problem, the most critical problem of the latter part of this century and certainly the next. I will try to make empirical references to problems in Africa because it is an area of which I am familiar, having spent a number of years there.

Population is a relative problem. In and of itself it seems to me to be unimportant; it is only important in relation to the environment. The critical issue is how we relate population to the context of environment in which it exists.

I would like to begin by saying that I do not find anything wrong with population and people. I think people are fascinating creatures, though on occasion historians and our own observations tell us that they can be very cruel and destructive. We also know that as a species they could be very loving and beautiful. If that is what people are, my logic tells me that the more the better. So the problem is not that there are too many people; there cannot be if that is what people are. I think that frequently our analytical mind assumes there are too many people and so the solution to the problem is to retain the number of people. We do not have enough concern for the beauty

of people; if we were really concerned as humanists we would try to find ways to make life more pleasurable and enjoyable for even more people, because in this sense the more there are the better off we are.

An article appeared in the New York Times on an analysis which had been done in one of our mid-western states on food thrown away as garbage, and surely there was enough thrown away to solve the famine problem in Africa. We have always had more than enough food. Population problems were really not our problems. We either became involved in them vicariously, or we were concerned that if the world's population increased and there was no increase in resources it was conceivable that there might not be enough to go around; we would have to do with less and therefore it became a problem.

The last couple of years have revealed to us in a rather frightening manner that we are susceptible to the kind of social, political, economic and environmental problems which have beset other people. Politically we have always assumed that revolutions, military coups and resignations of presidents were things which happened in Latin America or Asia or the less stable European countries. We now have had the cold realization that we are liable to these same things.

We have also discovered that we share the environmental problems of other countries--for example, we do not have enough fossil fuel to sustain ourselves. There is no reason why those people who have that fuel should make it available to us at the price we want to pay for it. We no longer control the sources of supply which provide the good life--someone else does. We can realize for the first time what it is like to live in an African or an Asian country where there is not enough food and to know that the control over the supply of it belongs to someone else. One has to depend on that other person's willingness to make it available, and to take it at whatever price it will be given. This is the kind of existence which has characterized much of the developing world, particularly southeast Asia and parts of Africa, for generations. I think our realization that we are not in control of our destiny, but that other people are in control of the good things which constitute our good life, will make us more empathetic toward the kinds of problems that exist for other people.

In considering overpopulation we tend to think of an overcrowded situation in which too many people live off an area of land. A truer determinant of overpopulation, however, is the relationship between the number of people and the kind of land area they have to live off of. A country like Tanzania is statistically not highly populated; an examination of the

the statistical yearbook would reveal that the number of people per square mile is quite low. But the important fact about Tanzania is that it is not a consistent, contingent kind of land map. It should be viewed more as a group of islands in a sea of essentially desolate land which is not worth very much. Looked at in this way it is indeed heavily populated. The pressure on the land causes social and political problems, and there are enormous communication problems. Probably it is more difficult to create a sense of unity, a sense of the commonweal, in a country like Tanzania which is one land mass, than it is in Micronesia, because the problems of communicating between modules of people are sometimes easier to solve over water than they are over land. So population planning enormously depends on things we do not think of too often, things that do not show up in statistics, and one example is the terrain of a country. Terrain affects economic development of a group of people, and yet is often overlooked.

The ethnocentric way in which we Americans view the world's population problems often makes up appear, despite the fact that we are erudite and have enormous statistics and research, to be somewhat arrogant and to lack feeling and compassion. African and Indian internationals who have lived in the U.S. for sometime are amused when they hear us passionately advocate population control policies for Africa and Asia where there are near-famine and famine conditions. They are aware of their countries' shortages of resources and the difficulties of providing for so many people. They are also aware of the enormous capacity of the American people to consume resources in large quantities, and this ridicules the argument that we ought to provide technology to control other countries' populations.

I have been involved in African studies, working with AID and the United Nations, and one of these projects concerned the possibility of implementing population control programs in Kenya and Afghanistan. I became aware of something very crucial to our efforts at population control, and that is that the point of view of a number of people in that part of the world is that it is simply a plot on the part of the "haves" to keep down the "have-nots", so that we, as those who have, can continue to conserve that disproportionate share of the world's goods which we now consume. They would say it is a fear on our part, the developed people, if indeed the African continent goes from 300 million to 600 or 700 million, of the fact that such a large grouping of people will command power.

If this group of people demands a redistribution of the world's resources we would not be able to continue to consume as much as we do. Therefore, our motives for investing in population control programs are construed as selfish. Those of us who would be involved in attempting to shape population policies in developing countries have to concern ourselves with such perceptions of our motives.

The magnitude of the problem is suggested by the fact that for every moment I have spoken eight people were born and only four people have died. The problem is complicated by the close interrelationship of the elements of time, energy and resources in the environment. For example, we know that there is a very close relationship between nutrition and the ability to learn, the capacity to learn and the rate of learning. Youngsters who are deprived of a well-balanced diet are more apt to have learning difficulties. At this present time we may be indebting an entire generation of children in developing countries to learning problems. These children, who represent the future leadership of their country, will have both learning and health problems, brought about by the famine conditions which characterized their youth. It is a vicious cycle. The tragedy is that we tend to perpetuate the planetary system of caste and class. If we condemn a people, generation after generation, to a subsistence kind of existence and to a subordinate status, we are perpetuating a system whereby a very small minority, essentially white, European-American, dominate the rest of man. That is inconsistent with the ideals which characterize the finer part of the species.

Our ability to help break this cycle is not unrelated to our perceptions of our own excess wealth. But unfortunately we are all terribly aware that these are difficult times. We do not feel quite as affluent as we did, and our willingness to contribute toward a resolution of the problems of our fellowman, either here in New Brunswick or in Kenya, seem to be proportionate to our perceptions of our own well-being. People talk about recession and some more desperate talk about depression. Ironically, as the problem is at its most crucial need in the developing world, our perceived relative ability to contribute solutions to it diminishes.

I would like to conclude by speaking very generally about the relationship of these problems to education, particularly public education. It has been stated that for whatever social problems we have, education lies at the heart of the solution. If there is anything which characterizes Americans particularly,

it is that if there is a problem education can solve it. We as educators are constantly being looked to, and if problems are not resolved then obviously we are doing something wrong, regardless of what the problem is. There is a mythical American faith in the power of the educational system to solve our social ills.

I am confronted nearly every day with people who expect that their personal, social, political, sexual and economic problems can be solved in some way within the educational system. I think education is important. It is a very vital and powerful institution, perhaps the most vital and powerful we have in today's world. It has a very profound influence on the direction of society. What has not been sufficiently appreciated is the fact that education functions within an environment of other institutions. Our analytical mind tends to isolate education, but complex problems obviously require complex solutions. Education can play an important part in the resolution of complex problems but it can only be effective if its efforts are coordinated with other institutions. For example, there is the problem of racism which is not unrelated to the problem of population control. Most of us would agree that racism permeates practically every social endeavor in our nation, sometimes consciously, more frequently subconsciously. We have asked our elementary and secondary school systems to accept responsibility for almost the full weight of the task of desegregating and integrating society. Schools can and to some extent do provide an interracial atmosphere. They can even provide an equality of opportunity in certain cases for all of our children. But the schools cannot integrate society; society has to integrate itself. All of the institutions that operate in our society must make a commitment to end racism while the problem can be effectively coped with. Putting the burden on schools exclusively is practically a guarantee that racism will continue, and become even worse.

I am mentioning this because it is easier to understand the relationship between education and a complex problem like racism than it is between education and population. The problems of population are probably even more complex than racism, if that is possible. Our attempts to cope with them are more recent; we have less literature and less experience. There needs to be a great deal more of pioneering and imaginative work done before we can develop satisfactory methodologies for dealing with problems of population growth other than in a narrow biological sense.

There has been an important study made by the Commission on Population Growth and the American Future. I would like to quote briefly from it: "The need for more

education and knowledge and the need to eliminate poverty and racism are important but they are not enough. But the population problem and the growth ethic with which it is eminently connected reflect deeper external conditions and more fundamental, political, economic, and philosophical values. Consequently, to improve the quality of our existence while slowing growth will require nothing less than a basic recasting of American values."

Further, the report states, "It is comfortable to think that changes in values or the political system are unnecessary, and that measures such as population education, fertility control information and services will solve our population problems. They will not, and such solutions do not go to the heart of man's relationship with nature, with himself, and with his society." According to this view, "Nothing less than a different set of values towards nature, towards the transcendence of a laissez-faire market system, a redefinition of human identity in terms of community, will suffice."

The report concludes that, "A new vision is needed, one that recognizes man's unity with nature, that transcends a simple economic definition of man's identity and that seeks to promote the relationship of the highest potential of our individual humanity."

I fundamentally agree with the Commission's conclusion, that new values and a new vision will be required to cope with the population problem. Technology will not solve it. Enormous ecological problems which confront modern man can be solved in no other way than an alteration of values and perceptions of one's relation to the universe, to nature, and to his fellowman. What is at issue is the fundamental relationship between man and his world. We are learning that in a post-industrial world, a world where technological manipulation of the environment shatters our very assumption about what is natural and what is unnatural, the conceptions about the relationship between man and nature which were shaped by philosophies and religions of an earlier epoch are completely inappropriate, and in fact may be dysfunctional. Therefore, I should like to ask, where can the new values and new visions be forged?

I think there is enough vitality in the American educational system for us to expect that a major part of the responsibility for shaping this new kind of consciousness be assumed by the schools, in cooperation and in coordination with other appropriate institutions. In this case I think that the media also have a major role to play,

especially television, which must figure in the definition of the relationship between children and the world.

I would like to conclude by saying that in my estimation, the question of what constitutes social responsibility in a post-industrial world is the most critical question of our time. Education--elementary, secondary, university--has an important part to play in the continuing search for answers to that very fundamental question.

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POPULATION AND FOOD

Roy Morse

I think it particularly appropriate to pick up on some of the remarks the Commissioner made about food, nutrition and education, not only for world needs but for our own particular needs. It is a subject which has concerned many for sometime. As the Commissioner pointed out very well, learning is closely identified with nutrition, particularly at early ages. One of the things that intrigues me is that although nutrition and feeding have been made part of the school service system along with janitorial service, schools have not considered very seriously the part which nutrition plays in learning. It is time to start considering this fact.

As my background indicates I worked some time in Tunisia on nutrition, and one of the practices there was to feed surplus non-fat milk to the children. The job was assigned to the janitors. There resulted a very serious outbreak of food poisoning. The janitors were instructed to dilute the milk with water but no one told them what kind of water to use, so they used water from a ditch, the sewage system, and succeeded in sickening quite a few children.

Another example of a feeding problem is here in the U.S.--should we add soy protein to meat in our school lunch programs. Fifteen percent soy can be added to ground meat and cannot be detected. The meat is not downgraded nutritionally; it actually is slightly upgraded. But there are sociological stigmas attached to the use of soybeans as compared with the higher social status of ground up cow. Many of the people connected with the school lunch program have said very clearly that they will not add soy to their meat, but 15% more children can be fed. Given this kind of dilemma, what should be done?

This is really the essence of why we are meeting here today. Some of these projects have been approached as purely nutritional problems. Whenever this is the case they have inevitably been failures, the reason being that feeding is only one part of a very complex cycle. We can go into another country, recommend a diet or a food composition based on what we eat in Omaha, and it will have very little to do with the local customs and traditions of the people that we are trying to feed, particularly children. Very often they will reject the food entirely and go on in the way in which they have been accustomed. India said a year or two ago that it would not accept any more food from the U.S. It is now undergoing famine in many parts of the country.

The first issue is: can we feed the world now with the amount of food we are growing? The answer is yes. Are we doing it? No. We know that thousands are dying daily. Then what is the problem? It is simply that of distribution. At this time one-third of the world, which fortunately includes us, gets two-thirds of the world's food. It is moving in the direction that, with each passing day, we, the one-third, are getting more and more, while the two-thirds are getting less and less. How long with our present food supply are we going to be able to feed the world?

Population is not changing at the same rate in all parts of the world, but if we consider an overall figure, it roughly is taking 32 years for the population of the world to double. It is very difficult to estimate population because, as the Commissioner has said, 120 babies are being born per minute, so whenever any figure is put out it is outmoded. Furthermore, the numbers in many parts of the world are not very reliable. In any case, if we look at the number of about 3 billion on the earth today, and take a doubling rate of 32 years by the end of the century, we will have a figure of 6 to 7 billion. Now there is something very difficult to correlate with it--can we feed 6-7 billion people. Even the most pessimistic agree that we could feed 7 billion with the resources available to us on the earth now. However, let us consider the next doubling rate. Incidentally, the doubling rate is always shortening. Probably the next doubling rate figure will be closer to 25 years, and so by the year 2025 there might possibly be about 14 billion people. The optimists feel that if we use every bit of food available on the earth the ultimate number of people we can feed is 30 billion.

Let us now begin to look at some of the complex interrelationships we have talked about. At least one-third of the food grown in the world never reaches humans, and there are estimates as high as 40 or 50%. Distribution is one of the biggest problems; there are simply no roads in many parts of the world. Other problems are the sociological and religious taboos. For example, the monkeys in India eat close to 10% of the food supply. We know of the taboo regarding cows but the monkeys are also significant. We tell these people that first they must decrease their birth rate and second they must get rid of their monkeys. That is a hard thing to do--they have been living this way for centuries. They feel that if they were to stop their religious practices they might offend the gods and die.

We have all heard about the new strains and varieties of rice being used in the Philippines. There were indeed

very significant increases by use of these new strains of rice, but someone was astute enough to observe that there were rats in the rice field and wondered how much of this potential yield was being lost to the rats. A rather low electrified fence was erected. It would not keep out people or any other large mammals which also could account for food losses, but it did kill many rats that tried to enter the test rice plot. In the total test time in this area 25,000 rats were killed, and no one had really seen one before.

We are now beginning to utilize new kinds of fertilizer and new strains of grain, but will this "green revolution" indeed produce increased food supplies at the same rate in which the population is growing. The answer is that even the green revolution is not going to solve the problem by itself, and in some areas it has actually done harm. For example, we have introduced high-yielding strains of wheat into certain sections of India where beans are normally grown. Beans have between 20-25% protein. The beans were removed and the wheat planted. Wheat has about 9% protein, and it is inferior. The quality of protein is as important as the quantity in a daily diet. Bean protein actually is an excellent protein, and there are many people in the world who survive on it.

Another aspect of the new varieties which has not been studied very thoroughly and should be, is that one of the techniques by which we receive increased yields is to plant the crop closely together and fertilize about triple the normal rate. Inherent in the green revolution then is a very much greater use of fertilizer. Just last year there was a world fertilizer shortage, and this refers back to the petroleum problem because one of the significant sources of nitrogen for fertilizer uses is ammonia, which is produced from natural gas. There have been suggestions that we should consider the nitrogen that is available from manure. It is calculated that of the nitrogenous need around the world there is enough manure produced to actually meet the need now without any problem.

Another aspect of the problem of feeding people is the utilization of the land in the best possible manner. One way is to consider the land as a potential source of nutrients. A small country like Tunisia which has only 4 million people can calculate the amount of nutrients it needs by simply multiplying its 4 million by the amount of protein needed per year, the amount of vitamin A, etc., and then calculate how much arable land it has. But 50% of the arable land in Tunisia is planted with grapevines. Grapevines have a useful function, particularly when Tunisia was under French

rule, for the French blended the wine produced in this country with several kinds of their own. At this time, however, the product currently contributes very little to the people of Tunisia.

Another example of a country in which old methods of farming have proved difficult to change is Turkey. Up until a few years ago 90% of the people in Turkey were occupied in agriculture. Wheat in Turkey was still harvested and processed basically as it was at the time of Christ. We can suggest to these people that if they wish to practice modern agriculture they should have a harvester. There are no harvesters in Turkey, and to obtain the money to buy them a crop has to be grown that someone wants to buy. To accomplish this, some of the land has now been taken out of food use.

The question of pesticides must also be considered. The central part of Ceylon has been uninhabitable due to malaria. When DDT became available after WW II the government sprayed the heartland of Ceylon and the population went from 8 million to 11 million. They have now followed our lead and have virtually banned DDT; Ceylon has malaria again. Can we have both--no pesticides and the same kind of food production we now know?

There are a few experiments that have worked to solve insect problems without the use of pesticides. An example of this is the control of the blow fly, which lays its eggs in cattle. The eggs enter the stomach of the cow and hatch, the larvae then boring its way out through the cow's skin. The hides are rendered almost useless, and an economic loss results. The blow fly is an interesting sexual creature because it has sexual contact only once in its life. Entomologists took advantage of this by sterilizing thousands of male blow flies by irradiation. This is only one method of eliminating insects without pesticides, but not all insects breed this way. Many insects have developed a resistance to the insecticides we presently have, and so new methods of eradication must be found.

We have spent much time in breeding new varieties of plants, primarily for their yield. Another important characteristic they have been bred for is insect, fungus and disease resistance. Some interesting results have come about. We have bred an extremely disease resistant variety of potato, but the potato was found to contain nearly 1% of the substance called solanin, a rather toxic alkaloid.

Another example of an unexpected result happened in Africa with a very important food there--millet or sorghum. The major problem in Africa with this grain are the birds. It was observed, however, that birds did not eat the millet which was darker than the rest. Darker millet was developed, but dark millet has tannins in it, and when tannin reacts with protein the protein becomes far less digestible. There are dozens of such disease resistant strains which are either toxic to the microorganism or toxic to us. So it is important that we not breed for new varieties unless we know what the overall effects will be.

The area of genetic engineering offers one of the best hopes for the future. It is quite clear that we will know in a reasonably short time the details of the genetic code. We might have to experiment with something relatively simple at first, for example, yeast. But eventually we will be able to regulate the genetic code whereby we could breed a cow with 96% butterfat. Genetic engineering offers on the one hand a gorgeous challenge and on the other a terrible responsibility. Who is going to be in charge of making people to what dimensions?

The World Food Conference, which took place in November '74, was somewhat of a disappointment. Our delegation consisted of three senators--Humphrey, McGovern and Clark--and the Secretary of Agriculture. All three of the senators are keenly interested in feeding the world; they would be classified by some as liberal democrats. Yet, they were trying to defend the position of the current administration. I do not want to move into politics, but of our four representatives, three were against one and they disagreed. We did not provide a very united front. Our first effort was to try to induce the oil producing states to spend some of their money. These states saw this as a political ploy and maintained that they would do things on their own terms. They do not have any food and they do have money, but that may not be the same thing.

In some parts of the world there have been two or more years of drought; a serious food problem is anticipated. The notification that there is going to be a food shortage has tremendous economic significance. The people on the inside will be aware that a shortage is coming and will be able to take advantage of it financially.

An agreement was made at the Conference that an early warning system will be established under the guidance of the World Food Council. It will not be under the U.N. or the E.A.O. but will operate separately, being kept small because of the fear that it would become bureaucratic and unmanageable.

I will summarize by saying that there is enough food in the world today to satisfy the world, but it is very badly distributed. If our population continues to grow at the same rate, in about one and one-half generations we will be unable to feed the world. We will have mass starvation.

Ques. Regarding the World Food Bank, what about the suggestion by some people that it would actually be more humane to let some people starve now, several million people, than to have several hundred million people starve later, because if there is a distribution problem and the population problem is not solved the ultimate result is simply postponed. What are your feelings on this?

Ans. There has been a very good book written about that idea called Famine: 1975. The author compared the food shortage situation to the idea of military medical practice. Of the wounded war, some are hurt so badly they will die, some are not hurt very badly so they are of no concern. The group in the middle who can be saved with medical attention is of concern. This idea is called triage. The analogy is made of India being picked as the country we are to abandon. I cannot make that kind of decision. Imagine the terrible power we have in our hands.

Ques. Are not the leaders of that country morally responsible before we are?

Ans. The problem is that this is between us and our own consciences. How much right do I have to eat very well when I know people are starving. One attitude is to eat whatever I want to eat and say that I cannot do anything about the starving. Another attitude is that I will eat less well.

Ques. Can the oceans solve the world food problem?

Ans. Regarding the world's oceans, we know very little about them. The world's surface is two-thirds water but it is not a place where things can be grown. There is no food in most of the oceans; food is found only in the area around the continents. To reap a sizable amount

of food from the oceans will take at least 20 to 30 years. We cannot do it in time to help those people now starving.

Ques. What about seaweed?

Ans. Seaweed is an interesting material, but it really is not a very adequate food by itself. The attempts which have been made to use these algal-like materials to feed the world are not very successful. Seaweed has not been well received. In Japan and Norway it is part of the culture, but most of the world will not accept it.

Ques. What impedes distribution most?

Ans. The lack of roads or lack of vehichles. Many of these countries have no automobile manufacturers. Each vehicle is imported.

Ques. Isn't it true that in certain religious beliefs in India it is considered immoral not to have children?

Ans. Yes. Also, in addition to the religious beliefs there are social security problems. For example, consider the culture of Ceylon which is matriarchal: the death rate of children is 50% by age five. By about the age of 32 a woman is quite worn from her strenuous life. To assure that she will have someone to take care of her she had better have several children, preferably girls. Since one out of every two children born is going to be dead at age five, if a woman has two children only one will survive. So she has four children; no one can tell these women not to have any children.

Ques. What part of the world's arable land is being used?

Ans. About 60%. In Europe the figure is close to 90%. In this country it is probably closer to 60%. Arable is a relative word considering the mountainsides in some parts of the world which are being used, and which we do not think of using here yet.

Ques. What do you suggest that we can constructively do in the U.S. now?

Ans. One thing some people do is cut back on the amount of beef they eat so there will be a larger amount of grain available for export. Another thing would be to work on education through the Peace Corps, etc. It is very important that people want what we are giving them, otherwise they will not accept the change. There is a group called the I.E.S.G. by which people in foreign countries ask for help and pay for it. Such a project which I worked on

in Turkey did succeed. I worked on a dehydrated baby food which could solve many distribution problems. It was based on the food the people there were eating, which was rice cooked with water. The nutrition value of the rice is about zero, but this food was nutritionally sound.

Ques. What is an adequate supply of protein?

Ans. The recommended daily allowance for protein for myself is 70 grams. About three-fourths of the world lives on a lot less than this. Is 70 grams really what we need; maybe 68 would be adequate.

Ques. Is a vegetarian diet adequate?

Ans. A vegetarian diet gives adequate protein. It is deficient in vitamin B_{12} but that is all. Brown rice alone is not adequate but when mixed with other foods the diet can be sufficient.

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POPULATION AND ENERGY

Linda Kirschner

I would like to begin by stating how our office views what is now happening in energy. The whole concept of energy is one that has been ignored, except for a very small segment of scientists and economists who for years have been concerned with the fact that we are running out of energy. The question of energy was ignored until a few years ago when we were stopped short by the Arab oil embargo. While we suffered hardship, the awakening was late in coming. We should not have waited for something like that to happen before looking at our energy supply and demand.

I will try not to be technical in my talk; I think the concepts are more important for us to understand. The consumption of energy resources of 1970 amounted to about 69 quadrillion BTUs. This is far in excess of the energy consumed by all the industrial countries in Europe put together. In Western Europe the population is 75% above that of the U.S., but this country is the leader in energy consumption.

If energy consumption and growth are to be measured in an economic sense, usually over a period of years the gross national product and energy consumption of this country run parallel to each other. Historically this was considered a very healthy thing. The government gave many incentives to oil companies and corporations to foster that kind of growth, subsidizing energy costs with taxpayer monies. While the taxpayer payed a very low price on a monthly basis for his gasoline or his natural gas or whatever the form of energy he used, he payed a tremendous amount for energy unknowingly out of his tax money each April.

Now we are realizing that there is just not enough energy to go around. There has been much speculation as to what our natural resources are and how many years we have left to use them. But that is really not the issue; the issue is that we are using our fossil fuels which are finite resources at a greater rate than can possibly be supplied. Consider the state of New Jersey: we are 68.8% reliant on petroleum and petroleum products. We live in the northeast corridor of the U.S. which is reliant on imported crude oil. Our supply of natural gas is serviced by pipelines from Texas and Louisiana. The Transcontinental Pipeline Company which

serves the southern portion of this state does not have enough gas. Plants are closing and people are out of jobs. What is wrong with our marketing system for energy, our resource development system, and our pattern of energy uses? What are our greatest sources of supply, both in the short-term and long-term? We must know the answers to these questions and plan around them.

We spend a great deal of time transporting energy to an energy plant. How much energy is wasted in the process of shipping a tankerfull of oil or transmitting electricity long distances? Concepts of reducing the demand we have for our energy, and ways in which we waste our energy, are really things which need to be considered.

One of the problems we are finding now as policy makers in a state agency is the great difficulty in determining what exactly needs to be done, and the methods by which the whole energy supply and demand situation can be turned around without causing a great deal of undue hardship. For example, the transportation sector uses more energy than any other sector of our economy: more than the industrial, university or residential communities. How many cars are there on the road, how many people are there in the state, how many people drive back and forth to work in their own car, the most energy intensive unit there can possibly be. But what can be done about it? Automobiles are a way of life in this country. What about mass transportation through trains and buses? Where do we obtain the money to provide mass transit facilities?

One of the things we are trying to do in our office is provide accurate information. People do not know what to believe and frankly I do not blame them. Washington says one thing; environmentalists say another. Energy can be viewed in the sense of considering what we have, what we need, and what we can afford. At the present time energy prices are rising and will continue to rise. They have been artificially low for a long time. How do we tell people on fixed incomes, elderly individuals, or people on welfare, that their heating oil needs will out-price their resources. Can the government, private enterprise or individuals in any way allow this to happen? There must be a balancing among all sectors of the economy, among all the needs of the people collectively, whether they be as a corporate entity or as single individuals. The balancing may be based on a profit and loss statement or on supply and demand considerations, or on the availability of enough food for one's table and enough warmth in one's house to live. The dilemma of energy is to balance everyone's needs. There is no one problem at this time in which energy does not

intertwine as a major consideration.

Our office is interested in informing the public. We are telling the public that we are using too much energy too fast, and it is very difficult for us to ask people to control their energy consumption voluntarily. Life styles seem to have a sense of momentum about them. Habits or patterns of living are very difficult to change. For example, each of us is used to driving our own car to work. It is difficult to decide to walk to the bus stop, stand on the bus if there are no seats, and begin our day that way every day.

It is necessary to have a basic understanding of the problems that exist. I was amazed at what people believe energy to be. People do not realize that when they plug something into the electrical outlet in the wall they are using a fossil fuel, that the generated electricity which comes out of that socket has something to do with crude oil. People do not understand that if a 200-watt bulb is changed to a 100-watt bulb there is a savings of a tremendous amount of energy, which means oil and money. Most people do not understand the difference which six inches of insulation between their walls and ceilings will make on their bills. These are very simple things which if understood and done can make a significant difference.

Michigan has an interesting home insulation program which was sponsored by their Public Service Commission prior to last February. Michigan utility companies put home insulation in 30,000 dwellings. The homeowners paid off over a period of time this investment which the utility company was making in their houses. The homeowners would have an increased billing until the investment was paid off, and then there would be a drop in their costs due to decreased energy usage. It worked very successfully until the Arab oil embargo took place and the price of energy went up. The costs to the people who participated in the program are just as high if not higher than they were before, but still lower than what they would have been had the insulation not been installed. How do we tell people that energy conservation is still the right thing to do, when even though they are using less energy they will be paying more for it?

In New Jersey there is a heavy demand for petroleum, petroleum products, natural gas, and electricity. Electrical demand is probably going to outstrip the demand for both oil and gas in the future, but at this time our concentrated problems are in oil and gas. In regard to natural gas, there is the issue of deregulation which is being debated. Currently, a regulated price has been fixed to gas as it comes out of the

wellhead and is sold on the interstate market. Oil companies, who are in most cases the gas producers, feel there is not enough incentive in the interstate price we have now. They propose that if we lift the restrictions on the price of the gas (de-regulate the prices) there will be more of an incentive to look for more natural gas.

The argument is that there might be higher prices for natural gas but will there be any more natural gas? We are not really sure. Government and business are still looking to our finite resources, which are the fossil fuels. There is not enough concentration on conservation and technologies to replace the use of those resources in short supply.

I have gone from the concepts of the fuels themselves to government policies to life styles. I would like to hear from you regarding any questions you might have.

Ques. Regarding the population sector and the oil problem, what you are asking for is some kind of economic and political change. Can what you suggest in the way of change be done within the capitalist framework?

Ans. There are those who believe that energy has been a product sold in the free market system. That concept is questionable in itself. If X is what the demand is, then X is what we should produce in the free enterprise system to allow supply to meet demand. That is fine and I do not think anyone would disagree with the concept, but what will be done when the demands outstrip the supply, and what kind of control and policy should be formulated to make sure that that does not happen. There are many things that are being done in an attempt to coordinate energy policy. Right now there is a tremendous problem in Washington where this policy is still formulating. There is a great need for federal energy planning.

Ques. Are you aware of any studies being done, either academic or in-house, on critical attitudes and value systems? Enormous sums of money are spent determining those societal values which account for a person's desire to buy something. Perhaps there are values involved with energy consumption. Are you aware of anything being done?

Ans. Yes, there are many things being done. I recommend that you consult the Ford Foundation Policy Report. In terms of conservative and liberal thinking, the Ford Foundation Policy Report is far left of the concepts coming out of, for example, the Department of Interior at this time. The Ford Foundation

thinking went into our own Energy Task Force Report which was produced in June '74. Basically, the report states that there is not enough energy, we must curb our demand for it, and suggests ways in which to do so.

Regarding any major issue, it is clear that New Jersey has the problem more intensely and sooner than many other states. There is, for example, off-shore drilling of the Jersey coast. The Department of Interior wants to lease 20 million acres of land to be explored for natural gas and oil. The supply projections from OCS range from the hope of there being a tremendous amount of oil to there being nothing at all. There is good reason to take a strong stand against the leasing. Rogers C.B. Morton, present Secretary of the Department of Interior, wants to do all of this by January of next year. He has circulated an environmental impact statement which contains only thirty pages out of two volumes on land use effects and economic impact. We still have no evidence that the federal government is interested in anything but further feeding of our voracious energy appetites.

What rights does the state have in an area forty to fifty miles out in the ocean? There is a case at this time, Maine vs. U.S., which is challenging federal control. We do know that we definitely have control over the last three miles along our coastline affecting tankers, pipelines, etc. But the court case should at least be resolved before tracts of off-shore areas of New Jersey are leased for production.

Ques. For general information on people's attitudes concerning energy, Philip Handler of the National Academy of Science made a broad statement a few weeks ago. The Academy will supply you with a copy of his paper. From the political sphere, Fulbright's address from Clayton, Missouri a few weeks ago has some of the broad concepts of attitudinal changes, philosophies, etc. Another primary source to obtain the data you are seeking is Friends of Earth.

Ques. What kind of investigation is your office making into alternative sources for energy?

Ans. There are technologies that are being developed now. Regarding solar and wind energy, there are a number of projects being done not in New Jersey but elsewhere, through federal funds. This work is being done primarily in the West and the Great Lakes area. I am very much in favor of the concept of solar energy; however, if people cannot understand the need for six inches of insulation now, can we have people to understand the need for a solar cell on the roofs of their houses?

Ques. What is the Energy Department doing to build up a national transportation system?

Ans. One of the things our office does is spend a great deal of time working with other departments because there is no one area that is not affected by energy. We are working with the Department of Transportation in promoting incentives to car pooling. Our mass transit system is sorely lacking. It is easy enough to travel from New York to Philadelphia, but difficult to travel from the southern end to the northern part of this state. Mass transportation facilities are in need of a great deal of money.

In our Energy Task Force Report of June '74, which I have already mentioned, we arrived at a series of conservation recommendations. One of these measures is a special registration fee for cadillac owners which would require them to pay $300 to register their cars. Such practices will come about eventually, but the difficulty is trying to institute these measures in a shorter period of time.

We must consider energy as it relates to land uses, the environment, and jobs. We must have sufficient planning whereby power plants will not be indiscriminately built, and at the same time increased energy needs will be anticipated and provided for. This kind of planning has not been done by state governments. Is there a department of natural resources on a state or federal level, or is there any one centralized place that deals with citing power plants, managing energy growth, collecting data on what kinds of fuel we have? We have no information available; it has been kept as an in-house secret by oil companies and energy producers. We must ask the oil companies how much energy we used last week, and we have to believe whatever they tell us because we do not know differently.

Another effort at energy management is a fuel economy label program which is EPA and FEA sponsored. Under this program a label will be put on a car after it is manufactured and before it reaches the retailer. The label will tell the buyer what the fuel economy of the car is and what it will take to operate it. We would like to make such labeling mandatory in New Jersey. People should know how much it costs to operate certain items: cars, appliances, etc.

I am aware that many of the policies I advocate are short-term, but they are necessary for us to have while moving in a long-term direction. Decisions have to be made, whether right or wrong. A decision that turns out to be wrong later can be amended; the important thing is to make some decisions as soon as possible.

POPULATION AND AIR AND WATER RESOURCES

Vincent Marchesani

I would like to discuss the subject of population as it pertains to air and water resources. Since I am employed by the New Jersey Bureau of Air Pollution Control, the main thrust of my presentation will be in the area of air pollution; however, I will also briefly discuss water resources.

I will start by offering a definition of air pollution. Legally, air pollution may be defined as the presence in the outdoor atmosphere of a gas or gases that will cause an effect on persons, animals, vegetation and/or material things. A general lay definition usually refers to smoke present in the air which we breathe. A more scientific definition is the presence in the outdoor atmosphere of a gas or gases which are not common to the "normal concentration of air constituent gases." That normal concentration is approximately 79-80% nitrogen, 19-20% oxygen, 0.03% carbon dioxide, and inert gases such as argon, neon, krypton, etc. Instead of using any one of these three definitions, however, I would sooner describe air pollution as what it is not, rather than what it is.

For example, an operating room at a hospital or a "clean room", such as a food packaging area one, would be considered areas basically free from air pollution. They would be free from air pollution simply because the air would be filtered. Needless to say, it would not be the pure form of nitrogen, oxygen, carbon dioxide, and inert gases. There would be some air pollution in very minor concentrations. Therefore, air pollution is a matter of degree. With present technology it is difficult and very expensive to live in an atmosphere of pure clean air. Therefore, we speak of air pollution as a matter of degree of pollutants in the atmosphere that humans, animals, vegetation, and material things could adsorb and absorb with no visible or subtle effect on life, vegetation or property.

I would like now to explain the position of the Bureau of Air Pollution Control in the New Jersey Department of Environmental Protection. Within the Department of Environmental Protection there are five divisions--Marine Services; Water Resources; Parks and Forestry; Fish, Game and Shellfisheries; and Environmental Quality. Within the Division of Environmental Quality are the Bureaus of Solid Waste Management, Radiation Protection, Noise control, Pesticide Control and Air Pollution Control. The Bureau of Air Pollution Control

has primarily an enforcement function, seeking to enforce the fifteen air pollution control chapters of the New Jersey Air Pollution Code.

One of the major sections of the Bureau is Evaluation and Planning. It is within this group that Environmental Impact Statements are analyzed, the New Jersey Air Quality Index is issued, and the data from our large Air Monitoring Network is analyzed. The New Jersey Air Quality Index may be an area that you, as teachers, might find interesting. The Index booklets (mentioned in the references) which are available upon request, will explain the detailed methodology used in determining whether or not New Jersey's air for a given location in the state is found to be good, satisfactory, unsatisfactory, or unhealthy. The Index is based on four air pollutants, namely, sulfur dioxide, suspended particulates, carbon monoxide, and photochemical oxidants or ozone. Records are kept of the Index on a daily basis from all of the air monitoring locations. Trend analysis and studies as to whether or not the air quality of New Jersey is improving may be determined by reviewing the data.

Another major area within the Bureau of Air Pollution Control is Local Program Development. It is in this area that the Bureau assists local programs in establishing and maintaining air pollution enforcement agencies in various locations of the state. Help is available in the form of Model Ordinances or technical information to anyone who requests it.

Another area covered by the Bureau is that of air monitoring. There are 22 air monitoring stations located throughout the state of New Jersey. Due to the fact that approximately 70% of New Jersey's population of 7,200,000 is located north of Trenton, the majority of the air monitoring stations are located in that area. Hourly data from all locations are available at the Bureau. An interesting fact is that New Jersey has the heaviest motor vehicle density of any state in the country, with more than 450 vehicles per square mile, and approximately 4,000,000 registered vehicles throughout the state. Seventy percent of all such vehicles are also located north of Trenton.

I would now like to describe the cyclic effect of air, water, and solid waste pollution. One cannot really discuss air pollution without including water pollution and solid waste pollution. There are three major ways of ridding air pollution: (1) Process change. This is the most desirable means for disposing of air pollution. Unfortunately, it is the most expensive, since the manufacturing process must be changed. (2) Filtration. Filtering of air is common practice today, in which a

filter is used to pass the air through, and collect the various gases and particulates on one side of the filter. Most gases will penetrate the filter; however, the particulates will not. This is a good way of cleansing particulates from the atmosphere. However, upon increased use a pressure drop will occur in the system due to the impaction of the dust and dirt on the filter. The filters are replaced and become solid waste pollution. (3) Scrubbing. This is an acceptable means of ridding air pollution from the atmosphere. Air passing through water will bubble and break the surface of the water and may be collected as pure air. This is similar to what occurs in fish tanks, where not only the dust and dirt but the gases as well are trapped by the water. Unfortunately, water pollution is created with this method. The water is then filtered to cleanse it. Once again there is clean water but there is also a wet dirty filter which may be considered solid waste pollution.

The problem now is how to dispose of the wet filter and the dry filter from the two methods of cleansing the air. The normal procedure is to burn them but that will again create air pollution. An alternative means would be to bury the filters in a landfill. Sanitary landfills are used efficiently throughout the state in solving the problems of solid waste pollution. Unfortunately, people do not choose to live near a sanitary landfill.

There are several aspects of air pollution which should be considered: Emission, Exchange, Effect, Enforcement and Environment.

Emissions are generally anything that is put into the atmosphere via smoke stack, tailpipe, etc. Emissions may be from power plants, industry, or even the motor vehicle. They make their way into the atmosphere via combustion and/or industrial processes. However, emissions are not exclusive to the major sources that I have mentioned. Emissions also come from things such as cigarettes, aerosol spray cans, etc. For example, in a city the size of Philadelphia, approximately ten tons per day of particulate matter, dust and dirt, go into the atmosphere from tire tread wearing out. Approximately six tons via cigarette smoke and ten tons from aerosol spray cans go into the atmosphere. The pollution from these sources may be considered minor but should be mentioned so that air pollution is not exclusively lumped into the major source categories.

Exchange is the process by which the air pollution is carried from the point of emission to the receptor, whether it be human, animal, plant or material. One example of exchange is an air pollution inversion. In

an air pollution inversion situation, a condition of high air stability occurs when a warm air mass settles over a cooler air mass. When pollutants rise into the atmosphere they are normally carried away by the cold air above with the winds that move through the system. When a warm air mass, the inversion layer, lies above the cool air below, it literally acts as a lid and traps the pollutants below. In the New Jersey and Philadelphia area such inversion conditions exist almost daily. They occur approximately between 7:00 and 9:00 a.m., but sometime between 8:00 and 11:00 a.m. wind speeds pick up and the inversion normally breaks up and disappears. In an area such as Los Angeles, which is a valley, the warm air mass settles into the valley and is not affected by the winds above. Under this condition inversion may exist for several days. On November 25 and 26, 1966, the inversion condition which settled over the New Jersey, Philadelphia, and New York area was of a nature similar to that which normally settles over Los Angeles. The inversion condition lasted for three days during which time high concentrations of air pollution were trapped beneath the air mass. Data for that time period indicated increased hospital admissions.

Effect is what occurs visibly or subtly to humans, animals, vegetation, or materials due to the presence of an air pollutant. The affected subject or object is known as a receptor. Data on effects is very difficult to obtain due to variability among the subjects affected.

Enforcement involves the regulatory type system, and there are laws that exist to prevent air pollution from going into the atmosphere. In New Jersey, fines for violations of various air pollution control regulations have reached as high as $100,000 to $250,000 for a violation. It should be pointed out that within New Jersey's enforcement system there is a provision that 90% of this fine is returned upon correction of the emission. It is an incentive to the industry to correct the situation since most of the fine will be returned.

Regarding the environment, since all living things are interdependent, when one area of life, whether it be plant or animal, is affected by air pollution other areas of life in the ecosystem will be affected as well. We must consider the overall effect on the environment of each air pollutant.

Two important pieces of legislation are the Federal Clean Air Act of 1967 and the Federal Clean Air Act of 1970. The Clean Air Act of 1967 called for the establishment of air quality standards on a state by state basis. These standards were to be concentrations of

air pollution in the atmosphere that would not affect humans, animals, plants or property. Studies were performed and criteria documents were published which resulted in states establishing their own air quality standards. Unfortunately, difficulty occurred in that all states did not select the same air quality standards. Since winds prevail from a westerly direction, a state selecting air quality standards of 100 would probably never obtain the standard for the pollutant if the state west of it had selected 150.

The Clean Air Act of 1970 rectified this problem by establishing National Air Quality Standards. The Act also required all states to write Implementation Plans as to how they would achieve all National Air Quality Standards on or before May 31, 1975. Each state was to write its own Air Quality Maintenance Plan, submit it to a Public Hearing, then file it with EPA for its approval. A summary document of the New Jersey Air Quality Maintenance Plan is available, upon request, from the New Jersey Bureau of Air Pollution Control. Due to the difficulty in achieving National Air Quality Standards for carbon monoxide and photochemical oxidants in 1975, an extension to May 31, 1977 was made.

The next area to be taken into consideration is that of the four phases of air pollution. The first phase had the establishment of regulatory agencies to prevent open burning. Later, these agencies began to visit plant sites to discuss emissions from major sources.

The second phase of air pollution control is air quality maintenance, in which concentrations of pollutants in the atmosphere are measured. These concentrations are in the parts per million and parts per billion range. The measurement of parts per billion is like locating one gallon of water in a billion gallons of the ocean. It is a phenomenal degree of sophistication. In the New Jersey Air Monitoring system, of the 22 locations presently monitored, the system is such that a button in the major control room in Trenton could be pushed to determine the concentration of carbon monoxide in Atlantic City at that instant. This system is available for all pollutants measured at all of the locations in the state.

Phase three is that of air quality modeling. This is a mathematical technique by which the concentration of a pollutant in a given area may be predicted prior to the establishment of a pollution source. Such evaluations involve gaseous plume distribution equations, and are cited in several of the references.

The last phase of air pollution control which I feel we are in at the present time is that of utilizing the

technique of air quality modeling for land use planning. Indeed, we have arrived at such a degree of sophistication that we can literally plan a city based on air quality. The techniques now available could help us to determine where the areas for the power plant, recreation, residences, etc. of a city should be located. Inputs such as emission inventory (the concentration of the emissions going into the atmosphere at various locations) and wind rises (wind directions and speed) would be input into the overall model.

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POPULATION DISTRIBUTION AND URBANIZATION

Donald F. Heisel

I propose to speak about some leading aspects of urbanization and migration. My main interest in the last decade has been in population problems as they occur overseas in developing countries. I will begin then by discussing first the world as a whole, giving particular emphasis to developing countries; I will then turn to the U.S. and finally make a few comments about what is happening in New Jersey.

Throughout my talk I will use the terms "urban" and "urbanization." Unfortunately, classifying urban places is confusing. For example, is New Brunswick a city on its own or is it part of the outskirts of New York City? I use the term "urban" to mean people living in towns or cities, or suburbs of the towns or cities. "Rural" will refer to people who live dispersed in the countryside or in a small village, typically of 2,000 or less. The formal definition is not uniform for all countries, and probably cannot be made so.

Let us start with a very broad view of urbanization, considering it as a result of both migration from rural areas and of natural growth. There has been much talk about the population explosion, but when the growth of total population is compared with the growth of city population, the former is literally dwarfed. In 1800, just as the industrial revolution began, there were a little less than a billion people in the world, and there were only 27 million people living in urban places. The world was a rural place and most people were peasants. About 3% lived in an urban area in 1800. Since 1800 the total population of the world multiplied about four times, so that there are approximately four billion people in the world today. But the population of urban places in the world has gone up to 1.5 billion, so that nearly 40% of the people now live in urban areas. Thus, total population was increasing about 3.5 times while the urban population increased about 50 times. That is a true urban population explosion.

There is considerable variation in population from one region to another. In Black Africa about 15% of the population is urban. Black Africa is the least urbanized major region of the world but it is also one of the areas that is urbanizing the quickest. Its cities tend to grow at between two and four times the rate of the total population, which is very fast. Asia and China are somewhat more urbanized than Africa; the population runs between 1/5 and 1/4 urban, and the urbanization rate is a little slower.

In the major third world countries of Latin America the level of urbanization is much further along; it is near 50% in almost all countries of the region. The rate of urbanization is as high as Africa's.

In general, the cities and towns of the developing countries are the homes of about one half of the world's urban population. However, the urban places of the developing countries are growing very much faster than the cities and towns of the developed countries.

In the developed countries, on the other hand, the proportions already living in urban places are high but the rate of urbanization is lower. North America--U.S., Mexico, Canada--is about 2/3 urbanized. In the U.S., about 75% of the population lives in urban areas. Our cities are not growing very fast; they are growing about 1-1/2 times the rate of the total population, and a number of our biggest cities have stopped growing altogether. Europe is quite similar to the U.S. in this phenomenon.

An interesting difference is that Eastern Europe is considerably less urbanized than Western Europe. A political line could be drawn which would also divide the more and less urbanized areas of Europe. The proportion of urbanization is about 50% in Eastern Europe and 75% in Western Europe. It is interesting to speculate on the causes and consequences of these different levels of urbanization.

Finally, the most highly urbanized area in the world, which it has been for nearly 50 years, is Oceania, with 80% of the population living in cities. Within Oceania, Australia is the most urbanized major country in the world. It is so urbanized that its cities are not growing fast in relationship to the rest of the population because most of the people are already there.

Such is the population distribution in the world today, with more than half of the total population remaining Third World rural peasants. However, the rate of urbanization is increasing rapidly. One of the things we must remember is that we are converting into a world where almost everyone will be living in cities.

I would like to talk about the U.S. in more detail. As was mentioned, we are 75% urbanized, having crossed the half-way mark on urbanization just before the 1920s. Of course, there is considerable variation among different parts of the country, although interestingly enough the differences are being eliminated

right now. At the turn of the century the New Jersey/ New York/Pennsylvania area was about 65% urbanized and the South Atlantic states were only about 15% urbanized. The South changed as a result of the civil war, but remained for a long time a less urbanized area than the rest of the country. Today the South Atlantic states have reached about 65% urbanization.

The South Atlantic region reached only now a level of urbanization that our region reached at the turn of the century. In terms of urbanization alone this is a regional lag of 70 years. On the other hand, we in the Middle Atlantic states are no longer living in the most urbanized part of the nation. The most urbanized region is the far West (that is excluding Alaska and Hawaii)--the Pacific Coast states. For example, Colorado is now over 80% urbanized.

The distribution of people in the United States reflects essentially the distribution of the white majority. Let us turn briefly to the internal distribution of blacks. The basic story of the black population is that it has changed very quickly from being largely rural to largely urban. They have experienced a very high rate of urbanization over the last 50 years and especially in the last 30 years; whereas at the turn of the century about 1/5 of all blacks lived in urban places, the figure is now at 3/4. The black population in the U.S. is our most urbanized group. Considering the history of race relations in the U.S. in the 50s and 60s, it seems to me that one of the most important things that happened which could explain the rise in racial tension was the very rapid and massive urbanization of blacks. The population transformed itself from a southern rural dispersed population to a highly concentrated, especially urban population, both in the North and South. This is certainly an important factor in race relations. A rural minority can be suppressed in a manner which an urban, highly concentrated population will not tolerate.

Regarding attitudes toward urban life in general, I think there is a major change in attitude here in America. In the past when urban and rural people were typified, there was what was known as urban sophistication and rural backwardness. I think values have reversed--we now look for the wisdom of the soil. This may be a symptom of the times in that rural life is becoming dearer and so we express a greater appreciation for it.

I would like to turn to the question of how the cities and urban areas of the U.S. are growing. In brief, the big cities are continuing to grow, but only at their edges and not at their core. For many places,

this means that the city as defined by its legal boundaries may not grow at all and even decline, while the growth takes place in the outer suburbs and perhaps even beyond. There is hardly a big city in the U.S. that is not losing population. All are growing at their outer edges. For the first time in our history the growth is occurring away from the industrial urban areas. The least growth has taken place in states such as Pennsylvania, New York, Ohio, Illinois and the industrial belt, across the northeastern part of the country, where the industrial revolution began.

Ques. Is the growth which has taken place at the edges of the city still part of the city?

Ans. I think it is still part of the city except in terms of where the political boundaries are and how important they are. One useful definition of a city is that it includes every area within commuting distance of the central core. New Jersey seems now to be divided into two zones--the zones within commuting distance to Philadelphia and New York City. European cities show the same phenomenon--the center of the city is growing less dense while the edge is growing more dense, as people have access to better means of transportation into the city. Of course, one thing which determines where a person will live is where that person can buy a house that will still permit him to commute to work. People still have urban occupations, but the cities are so large that their centers are no longer important as residences and for much retail trade and personal services. Greatly spread cities are beginning to emerge in many areas. A few years ago people were talking about the U.S. becoming partialled up into three big metropolitan areas: Boston to Washington/Chicago to Pittsburgh/San Francisco to San Diego. The most recent evidence, however, suggests that this may not be happening. The eastern section in which we live is not growing so fast, and there are other areas--Houston and Dallas, Atlanta, southern Florida, coastal Florida--which are growing quite fast. For the first time in our history the migration is no longer out of the South and into the Northeast.

There are figures for 1970-73 which show that the area of the country losing population most quickly is the Northeast--the Middle Atlantic states plus New England. New Hampshire, Connecticut and New Jersey are still growing because they are receiving the people from the big metropolitan cities, but Pennsylvania and New York are standing still. The big gainer is the South.

Ques. What is the average age of the people going south, and the type of people going?

Ans. We have some information on age, but not on other characteristics of those who are going. One of the most interesting things is that relatively younger people are going south; it is not just a practice among those who are retiring. Another interesting thing is that the net migration of the black minority is into the South, from the Northeast. I have a question: is this the new middle-class black going to the new kinds of jobs opening up in Atlanta and Orlando, or is this simply a turning away of the unemployed from growing stagnation of employment opportunities in the North?

Now let us focus on our own state. There are interesting statistics on New Jersey which reflect the national pattern of population. From 1970-73 New Jersey grew about 2-1/2%, and of that about 1% represents emigration from other states. Like the rest of the country, the growth in New Jersey has been at the edges of the urban areas. I think it is rather striking that the big gainers among the state's counties over that three-year period are: Ocean County, which grew the fastest by 18% in three years; Cape May, with a growth of almost 12% in three years; and Sussex County, with a growth of 7-1/2% in that period. These three counties are the most removed from the center of things, being classified as not being part of any metropolitan zone.

Ques. Is part of the urban growth due to the fact that the rural area is increasingly assimilated into the urban area? There is an increase of urbanization and decrease of rural area.

Ans. Yes, that is exactly what is happening in New Jersey and across the nation. Rural areas are being consumed by the great urban sprawl. I would think that at the next census none of New Jersey will be classified as rural; all of it will be urban. There will still be some empty spaces that have been protected by legislative control; for example, the Pine Barrens.

Ques. Do you know how much vacant land as compared to urbanized land we have in New Jersey?

Ans. It is hard to say. What is vacant? If a farmer lives on a twenty-acre farm, is it vacant? The density of population may go low but it is never really vacant. For example, an anomaly which makes the state look less crowded than it is, is the city of Linden with its great oil refineries. Linden has the lowest density of any major city in the U.S. but it is hardly what you would call vacant land. Density is relative. If you are a two-person family living in a five-room apartment on Park Avenue, your density is very low. If you are an eight-person family living in a small dwelling in the Pine Barrens, your density is very high.

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POPULATION, POLITICAL SYSTEMS, AND GENOCIDE

Barnett F. Baron

Population affects politics in a variety of ways. It is useful to break population down into three aspects in order to consider how it affects politics. One needs to be concerned about the size of a population (the numbers of people), the distribution of a population (where they are), and the composition of a population (who they are).

The United States House of Representatives provides an example of the way in which population size affects politics. In the nineteenth century, it was often said that Representatives could have little real communication with their constituents because the distances between Washington and the congressional districts were far, and because means of transportation were less available and slower than today. It can be argued that as long as there are only four hundred and thirty-five Representatives in the House as the number affixed by law, then population growth today is the equivalent of geographical distance one hundred years ago. The more people there are in each district, the more difficult it is for a Representative to have effective communications with his constituents. In 1970, the average congressional district contained four hundred and seventy thousand constituents. By the year 2000, if the average American family continues to have about three children each, the average congressional district will have 736 thousand constituents or about half again as many as in 1970.

The United States Senate is not based on population size. Each state has two senators regardless of its size. However, the Senate is becoming increasingly unrepresentative of the American population because the states are becoming increasingly different in size. In general terms, the American population is migrating from the Northeast and Northcentral states to the West. It is shifting from the Midwest to the West but it is remaining relatively stable in the South. This means that people are becoming concentrated in the larger states in the Union. This has very direct political consequences. For example: a two-thirds majority in the Senate is needed to override a presidential veto. In 1970, assuming that both senators from each state voted alike, twenty-size states were needed in order to override a presidential veto. In 1970, one could find twenty-six small states which would have only 16% of the population of the United States in them. Looking at it from the other side, to block the Senate from

overriding a presidential veto, only one-third of the states are needed. The seventeen smaller states in the union in 1970 contained only 6.7% of the American population in them. Thus, the Senate is not, in terms of population size, a representative body, and as population grows and increasingly concentrates, the Senate will become even less representative of the American people.

Composition is another important factor in relating population to politics, particularly racial composition. Recent trends in the United States show that central cities are becoming largely non-white and the suburbs largely white. By the year 2000, it has been estimated that 70-75% of all the non-whites in the United States who are not living on farms will be living in central cities, and that 72-78% of all whites who are not farmers will be living in suburbs. Congressional representation is going to change to reflect these differences. In 1970, tne central cities in the United States were represented by 96 congressmen. By the year 2000, central cities will have only 58 congressmen. Suburban representation, which will be largely white, will rise from 145 Representatives in 1970 to 260 in the year 2000. These numbers, of course, may not be precise, but the trend is clear. Increasing racial separation in the United States will be reflected in the composition of congress and therefore in the representation that minority groups have.

There are, of course, other ways in which population size, distribution, or composition affect politics. One example is the voting power of ethnic groups, racial groups, or special interest groups of various kinds. If one group grows faster relative to another, then its representation in a political system increases. If the concentration of a particular group of people increases in one area, then it tends to form a solid voting block. On the other hand, if it is dispersed its voting power is diminished. This fact has long been recognized in American politics; the process of of gerrymandering, or the process of designing electoral districts to reflect the attitudes of people living in them, is a long-standing practice.

The amount and location of social services, such as schools, hospitals, transportation systems, utilities and sanitation services, depends in part on how many people are living in a given area and sometimes also who they are. Federal revenue sharing schemes, whereby the federal government gives back a certain proportion of the taxes to the states, are also based in part on population size. As state populations change, the amounts of money received from the federal government may increase or decrease. In New Jersey, for example,

where there has been a slight decrease in total population in recent years (while at the same time a slight increase in the non-white population), there has been a reduction in the amount of federal revenue coming into the state.

Population size may also affect the way one looks at international relations. Many states in the United Nations argue that they need large populations in order to exert any influence in international politics, and that population size determines national power. Many African states, for example, argue that with populations of only six or eight million people, less than the city of New York, it is not in their interest to adopt any kind of family planning program if they wish to achieve national power comparable to that of other countries. In Latin America, Brazil, for example, argues that it has enormous economic resources but a population of only about one hundred million people. The government of Brazil has stated an explicit goal of having 200 million people by the year 2000. They argue that they have enormous resources and need the people to fully develop their country. They consider their program to settle the Amazon Basin as being equivalent to the settlement of the American West. In both cases, they argue, population growth increases national power and wealth rather than decreasing it.

Those who argue that large populations are needed to achieve national power point to the fact that the two largest developed countries in the world, the United States and the Soviet Union, are also the two major world powers. They also argue that the two largest underdeveloped countries in the world, China and India, are both relatively strong powers and both possess nuclear weapons. Thus, there is a strong belief that the more people a country has the more powerful it is likely to be in international politics.

But there are contrary arguments as well. When military technology was based on swords and crossbows, population size did indeed add to military power. With modern military technology, however, population size has become less important than such factors as levels of literacy and technical skills, levels of technological development, the amount of resources available, and the degree of political organization and mobilization of a population. Indeed, only if sufficient capabilities and skills are available, and a stable political structure exists, and the resource base can sustain the existing population, can population size be considered an asset rather than a liability. The large, unskilled, and poorly organized populations of most developing countries

are more likely to act as an impediment to the development of national power than an asset. The example of North Vietnam successfully waging war against South Vietnam and the United States shows that population size alone, or even technological skill, is not a sufficient basis for military success. In the Middle East in 1967, Israel, with a population one-tenth that of Egypt, nevertheless had a larger army owing to higher levels of literacy and technological skills among its population. On the other hand, the Egyptians argue that their larger population was of benefit to them because they were able to suffer greater losses than the Israelis without that having as much effect on the country as a whole.

Rapid population growth in many developing countries adds to the burden of providing social services to the people. More and more money has to be put into basic social services in order to keep up with growing populations. In terms of agricultural production, more and more has to be produced simply in order to provide a constant level of caloric intake. Thus, instead of being able to invest in industrial production or in activities designed to improve the quality of life in developing countries, most governments facing a rapid population growth must increasingly use their scarce resources simply to keep up with the growing population.

Population growth is also assumed by many people to lead to real or potential international conflict. We have all heard various hypotheses about how this might work; for example, you may remember the notion of lebensraum, in which nations that are densely populated seek more living space. Another idea frequently heard is that excessive population size leads to a decline in the perceived value of individual human life. Leaders of such countries are believed more likely to adopt irrational and adventuresome foreign policies which lead to conflict. I am sure you have heard some variation of this theme with respect to the Chinese, or the North Vietnamese in the recent war. The best evidence would indicate, however, that population in itself does not cause conflict. Simply because there are more people in one country than in another does not mean that there must be conflict, nor does population growth itself necessarily lead to conflict.

If population growth does lead to international conflict, the process is very indirect. One recent study examined the European experience between 1870 and 1914, and concluded that population dynamics do not appear to be primary causes of violent conflict between states, and that the critical elements involve less population itself than the way in which population combines with other factors to produce conflict. The most important other factors are resources and technology. The

relationship in that study can be summarized as follows:

> The larger a nation's population, the greater the need and demand for some irreducible minimum of food and other basic resources;
>
> The more advanced the nation's technology, the greater the variety and quality of needed resources;
>
> The more advanced and specialized a country's technology, the greater the range and quantity of things that political leaders believe the nation needs, and at the same time the greater the nation's capacity to fulfill those needs;
>
> Perceived and real resource demands combine with technological capabilities to produce "lateral pressure," a tendency to undertake activities progressively further from national boundaries in order to acquire influence and control over more territories, people, and physical resources;
>
> To the extent that two or more countries with high capabilities and high lateral pressures extend their interests and psychological boundaries outward, the greater the potential for conflict.
> (Nazli Choucri, Population Dynamics and International Violence)

Thus, the relationships between population dynamics and international conflict in this study were shown to be indirect, long-term, and dependent on complex interactions among several factors.

The combination of rapid population growth in developing countries and the growing competition for scarce resources, particularly energy resources that tend to be found in those countries, does create a potentially dangerous situation.

In a still unpublished paper in which he analyzes the relationships between changes in the international system and global demographic trends, Kingsley Davis, Professor of Sociology and Comparative Studies at Berkeley, argues that population control programs sponsored by developed countries are clearly linked to the needs of industrialized countries for raw materials. He notes that while in 1929 developed countries produced 91.9% of the world's supply of energy and consumed 93.9%, by 1970 they produced only

65.8% and consumed 85%. In the same time period, he argues, the per capita consumption of energy in developed countries increased by 136%, while it increased in developing countries by 391%. (In fact, however, the less developed countries are falling behind, since the actual amount of per capita consumption in developed countries over the period rose ten times more than in less developed countries.)

Thus, says Davis, rapid population growth in the former colonies is perceived to be adversely affecting the interests of the advanced nations.

> "It was producing an enormous and expanding migratory pressure, an escalating demand for international aid, and a progressive exhaustion of natural resources. Above all, it was raising the spectre of the use of natural resources in backward areas to support the burgeoning local population--resources even more badly needed by the industrial nations. The habit of expropriating foreign assets did nothing to allay this anxiety. Given these concerns and interests, it is little wonder that the initiative in population limitation policies came primarily from the industrial countries and was aimed at peoples abroad (rather) than at home."
> (Unpublished manuscript, "Population Dynamics and International Relations")

Much of the concern in the developing countries that population control is a new form of genocide is based on the belief that the developed world is attempting to attack the problem of poverty by eliminating the poor rather than by changing their own consumption habits. The developing countries argue that the world's resources should be redistributed so that the United States, with only about 6% of the world's population, would not consume about a third of the world's total resources each year.

The World Food Conference held last month in Rome highlighted some of the major problems of resource distribution facing the world today, and the associated ethical and political issues involved. Plans were discussed at the Conference to establish a World Food Bank to assist those countries faced with major problems of starvation. It was argued that the only way to help those countries is to pool the agricultural surpluses of the United States, Canada, Australia, and possibly the Soviet Union into a food bank which can then be drawn upon to assist nations facing starvation, as was recently the case in the Sahelian countries of West Africa. There is also a counter-argument that I would like us to discuss, because it

raises in very dramatic fashion the conflicts between rich and poor countries.

In a recent article entitled "Living on a Lifeboat" Garrett Hardin argued very strongly against the idea of a world food bank.

He likens the situation to a lifeboat which has 50 people and a capacity of 60, surrounded by hundreds of people in the water. What does one do? Take in ten, reach the capacity of the lifeboat of 60 and have no safety margin? The boat sinks and all are drowned. That is the situation he thinks we find ourselves in now, heightened by the world food crisis. The drawing below illustrates what he and others call a natural ecology.

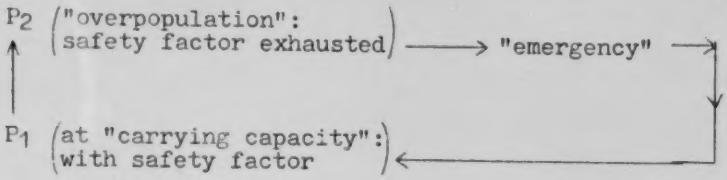

Fig. 1. The population cycle of a nation that has no effective, conscious population control, and which receives no aid from the outside. P_2 is greater than P_1.

All societies, animal or human, he says, eventually balance themselves against the resources available to them. Historically, populations continue at a so-called carrying capacity with a slight margin, and are balanced between the birth and death rates. But if something changes--for example, help intrudes and more people live, or fertility increases and more people are born, very soon there is overpopulation with respect to the resources available. Historically, as populations grew, a time came when the population could no longer feed itself. People died of famine. The population ultimately came back to the first step, to its natural carrying capacity. According to Hardin, the World Food Bank would upset the natural ecology. The same pattern would happen--there is overpopulation and an emergency results. The World Food Bank intervenes and provides food so that population has now moved to the next level, as shown in the next drawing. Again there is overpopulation and it reaches a point where the international food aid is no longer sufficient to feed the population. The population keeps growing as long as there is food. The capacity of the U.S., China, the Soviet Union, and Canada is limited, finite. Eventually this capacity to produce emergency

food aid will be exhausted, and the resulting catastrophe would be even greater than if the decision were made now to restrict aid to only some countries.

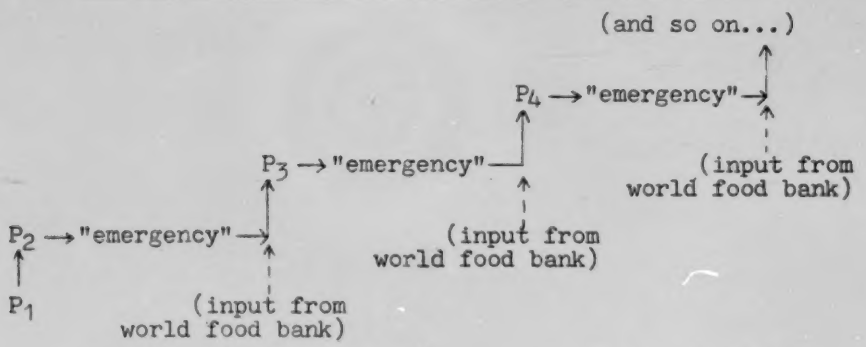

Fig. 2. The population escalator. Note that input from a world food bank acts like the pawl of a ratchet, preventing the normal population cycle shown in Figure 1 from being completed. P_{n+1} is greater than P_n, and the absolute magnitude of the "emergencies" escalates. Ultimately the entire system crashes. The crash is not shown, and few can imagine it.

Hardin approvingly cites a recent work (William and Paul Paddock, Famine - 1975, Little, Brown, 1967), in which the authors argue that the United States should adopt a food aid policy based on the concept of "triage," borrowed from military medicine. Under such a system, countries faced by starvation would be grouped into three categories: those that cannot survive the effects of rapid population growth anyway, and to whom no aid should be given; those that could survive without aid, although hurting, to whom no aid should be given; and those countries that could be induced to adopt strict policies aimed at reducing population growth rates (and who are also attractive for political, economic, and military reasons), to whom alone food aid should be given.

On the other hand, in his address to the World Food Conference, Pope Paul argued that:

> "It is inadmissable that those who have control of the wealth and resources of mankind should try to resolve the problem of hunger by forbidding the poor to be born, or by leaving to

die of hunger children whose parents do not fit into the framework of theoretical plans based on pure hypotheses about the future of mankind. In times gone by, in a past that we hope is now finished with, nations used to make war to seize their neighbors' riches. But is it not a new form of warfare to impose a restrictive demographic policy on nations, to ensure that they will not claim their just share of the earth's goods?"

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POPULATION AND WOMEN: AN EAST AFRICAN EXAMPLE

Josephine M. Moikobu

In recent years there has been an increased concern, particularly in the developed world, for improving the quality of the world's human and natural resources. Specifically, ecologists, social scientists, educators, politicians and others have expressed deep concern over the accelerating imbalance between natural resources on one hand and population increases on another.

In today's talk I would like to raise some of the fundamental questions concerning the subject at hand. My objections do not necessarily question the validity of world population control. Rather my basic concern is focused on the ethics of using women populations in an experimental way.

While we note that the world population comprises both men and women, most birth control and family planning methods are clearly geared directly at women as a target population. Why have not birth control methods been geared to men as a target population? The answer is clearly political.

Our attempts to understand the larger problem of population and women must also include some reasons as to why family planning has not succeeded the way it perhaps should have in the Third World, while it has succeeded in the Western world. First, the Western world's populations did not become persuaded to adopt family planning methods overnight. It took drastic processes of technological advancement in all spheres of life--for example, advancements in medicine, health care, social security, industrialization and so forth. It is easy for a family in the West to accept and adopt family planning patterns because the couple knows with a higher degree of certainty that the two children they have planned to have will probably live to an old age. In developing nations, however, we are still not that certain. We have our ten children so that among the ten, perhaps three or four might survive to old age. When we object to family control measures it is because we face problems which are not readily apparent to the Western world.

In the developing world there has been considerable interest in ecological questions. In today's talk I would like to focus specifically on the question of "population and women," as these two variables are obviously interrelated. I will use as examples the societies of that part of the Third World which I

know best, namely, East Africa. Our discussion will be directed at family planning programs, since such programs are overwhelmingly aimed at women. It is my contention that family planning programs in many traditional cultures are doomed to failure unless one is willing to argue for and/or implement rather questionable policies of culturecide or cultural stripping. Efforts to introduce family planning cannot be understood apart from a cultural dimension which often, at least in East Africa, makes it quite irrational for women to adopt Western forms of family planning designed to limit their procreative abilities. We turn now to a specific discussion of one such society which will provide us with contextural information in support of my position. I will then enumerate and compare the East African situation with several other examples drawn from elsewhere in the developing world.

I would like to talk about the Baganda people and family planning. The Baganda, numbering about two million people, are located on the northern and western shores of Lake Victoria in the southern part of Uganda. They have often been described by anthropologists as being comparatively strongly committed to the process of modernization, seemingly accepting with great facility such things as modern technology, clothing, and formal education. In fact, one anthropologist has noted that other tribes in Uganda refer to Bagandas as "Black Europeans". In spite of their apparently enthusiastic commitment to modernity, efforts to introduce family planning have been largely unsuccessful. One psychologist, Janet Kilbride, has conducted extensive research on child development in Uganda. She reports that many Baganda women believe that the pill causes sterility, so it should be avoided. This is in part a rationalization for a more general mistrust of family planning techniques. An understanding of why this mistrust exists requires a knowledge of the cultural values pertaining to a woman's role in the Baganda society.

The Baganda society is organized around a principle of clan affiliation so that each person belongs to one of thirty-eight clans. Each clan has its own unique history, land, and officials. Descent is traced through one's father, so that each woman is in effect a member of her husband's clan. It is not surprising, therefore, in this structural situation that the most common ground for divorce is that of female barrenness. In fact, it is not even recognized that a man can also be barren. Children are valued, among other things, for their role in increasing the size of their father's clans. The value of a large clan can be explained by the society's ideas of death and the afterlife. The Baganda believe that after death a person's soul joins the community of

ancestors of his clan, often residing for a while near the compound of those left behind. The deceased will be venerated by his living kinsmen in their daily prayers, and so remembrances of him will live on in the thoughts and actions of the living. More fundamentally, it is believed that an ancestor can be reincarnated in the person of one of his progeny, so the larger the progeny the greater the likelihood of the deceased being reborn.

I do not want to discuss this aspect too deeply, however, because this enters the realm of ethics and philosophy, and individual cosmic perception. Our belief simply is that our souls will be reborn through our children. When we are told that we must practice birth control, what we are really being told is that we must stop living, because life to us involves the past, present and future generations. This is something that is very fundamental within the African traditional way of life. We Africans perceive our cosmic world as continuously cyclical. To us, people do not just die; there is a huge blanket of fear of the unknown to those who believe so. According to our philosophy of life, we know where we have been, where we are now and where we are going. If family planning is practiced there is that much chance that the rest of the deceased members of the family or clan would not be reborn. This, to us, spells finity.

Children are desired for other reasons beside clan considerations. When Baganda men were asked by Philip Kilbride as to why they desire children, the most frequent responses included: the clan will be increased; the father will be remembered through his children; the father will receive comfort in poverty and old age; assistance will be provided in the home; the parents will be served. When Baganda women were asked as to why they want children, their responses were: to keep their husband happy; to have assistance in the home; to be helped in old age; to gain respect from other women; to avoid the plight of barrenness.

It is apparent from these statements that children serve another important purpose--in the absence of state welfare and social security, it is primarily to children that parents will turn for assistance. I do not believe that any of the reasons which the Bagandas gave for having children would be so markedly different from other peoples' reasons for having children.

Because of the social security which exists in this country an adult is expected to be independent. This implies that in terms of social relations people can become more segmentized. Reliance and dependency

on other people is shifted to external specialized agencies. If one is healthy, "normal", and occupationally attractive, there is no problem in coping with the difficulties of life. One will not go back to his family at the age of twenty-five, thirty or forty and express need of any nature. The family would probably maintain (and rightly so) that the son or daughter is now an adult and should take care of himself. We in Africa do not have that kind of concept; one always knows that one cannot really become completely independent of other people. One always has to keep lateral as well as vertical relations with others, being able to rely on others and also help others when necessary.

This form of mutual help and interdependence is all very complicated to those who are not from this kind of culture and social norm. My experience of living in the United States has taught me that to need help is often translated as a sign of weakness, whereas in Africa to need help and to offer help is not a sign of weakness but of strength. Thus, in the Third World to have many children is a way of insuring help, by adding that many more people to the immediate group in which one lives.

With regard to birth control, the Baganda have not had any systematic contraception apart from abstinence. Abstinence is ideally practiced while the mother is nursing a baby. Many married couples abstain for several months after the birth of their infant. It is believed that to become pregnant while breast feeding is detrimental to the health of the suckling infant. So the Baganda, as many other non-Western populations, have an indirect mode of family planning.

My intention has been to substantiate the importance played by the cultural dimension in understanding why such well-meaning efforts to introduce programs of planned parenthood have not worked in many traditional societies. Culture here is referred to as a design for living or as a standard for proper behavior in a given society. Often cultural differences are reflected in efforts to translate meaning across languages. For example, Everett Rogers' study points out that in new nations today the concept of family planning is used as part of the title for changing fertility behavior. When translated, this concept connotes the following meanings: "kinship planning" in East Pakistan and North India; "to prevent reproduction" among the Kisii of Kenya; "planning the extended family" in Spanish Latin America; and "planning of households", among the Kikuyu of Kenya.

I have used the Baganda as an example of the resistance which Third World countries have against family planing. The positive value attached to having many

children is common among many traditional cultures. In my own society, the Gusii of western Kenya, children are also very highly desired. We have the practice of "child lending," in which a woman without children of her own is lent one or more children by her relatives who may have many children. The southern Sudan people have a custom referred to as a "ghost marriage," in which a brother of a man who dies without progeny begets children on the dead man's behalf. These children recognize the dead man as their rightful father and are socially recognized as his real children.

Perhaps the best known example of a cultural barrier to efforts of introducing family planning is provided by India. I now quote from a recent article in the New York Times of Paul and Anne Ehrlich:

> "Statistics on the accomplishments of India's program are superficially at least impressive. Since 1965, 14 million people have been sterilized, nearly 5 million I.U.D.s have been inserted, over 320 million condoms have been distributed, and millions of pills and other forms of contraceptives have also been provided. It is believed that at least 13 per cent of married couples of reproductive age have been reached by the program. Yet, despite all this effort, India's birth rate is still around 40 to 42 per cent per 1,000 (according to the U.N., India claims 37, but its census data are extremely suspect), and the population is fast approaching 600 million. What has gone wrong?
>
> A further examination of family planning statistics provides a clue: the average candidate for sterilization or contraceptives has at least four living children and has borne five or six babies. The same is true in nearly all underdeveloped countries for which figures are available. Like peasants in most countries, rural Indians (80 per cent of the population is rural) depend for security in old age on their sons. Given India's relatively high child mortality rates, a couple must bear at least six children in order to ensure survival of one son to adulthood. Small wonder they view family planners' propaganda to "stop at two" as slightly insane. They are not going to use contraceptives to reduce their family sizes because they want large families."

If there is a cultural dimension in family planning, what in effect can be done? Should family planning programs be directed at men since efforts to persuade only women to plan their families have failed? I think not. We have seen that at least for the Baganda,

both men and women desire children. Should we attempt to destroy traditional cultural systems where children are highly valued and transform such non-Western cultures into a wholesale Euro-American cultural system? In my own opinion, this is probably the only effective way in which family planning can be successfully introduced and implemented. It seems, however, ethically questionable to engage in culturecide, if it is expected that the world's cultures must conform to the Euro-American ideals of rugged individualism, factory labor and impersonal social relations. I prefer a system which emphasizes social involvement, clan membership, reincarnation through children, and in which progenies are traditionally desired, where children are highly valued and in which the institutions of orphanages and nursing homes are yet unknown. I concur, once again, but for different reasons altogether, with the Ehrlichs who state that:

> "Does this cultural barrier...mean that there is nothing that the American can do to hold back the world population flood? Should we not ship pills and condoms to the underdeveloped countries; should we not help them industrialize; should we not send them medical aid to lower infant mortality? We probably should not, except under very special circumstances."

If we are not to focus directly on family planning and population control, which in effect amounts to culturecide, what then shall we do? There is of course no easy solution to these complex ecological and moral questions. I leave the solution to those of you who are concerned enough to reflect upon the issues at hand. I personally find merit in the opinions of Pope Paul VI and other heads of state of the developing world who feel that the answer lies in the development of scientific and technological capabilities to increase our food resources. Certainly, research could be directed at exploring the oceans for food, developing synthetic food, transforming deserts and other barren areas into farming areas, and so on. This seems to be more profitable in the long term than pursuing family planning, and constantly relying on aid from developed nations.

In this talk I have stressed the importance of the cultural dimension in implementing any new practices in a society. In most of the Third World nations where birth rates are high, women are valued because of their ability to bear not only a few children, but many children. If we are asking them to family plan without changing their cultural dimension they will suffer the social consequences. Perhaps family planners should

first change the cultural attitudes of a society towards women and children, before they try to implement family planning practices. More birth control methods should be developed for men so they might become the target population for family planning.

Educators in this country, therefore, should be more attuned to cultural dimensions in their efforts to teach family planning in their communities. The crucial idea that I want to convey is that traditional societies are not irrational resistors of change and innovation. On the contrary, such people are culture-carrying individuals who resist family planning for quite rational, culturally constituted reasons.

Indeed, understanding the cultural aspects of the Third World has important implications for efforts here in the U.S. to introduce family planning for minority groups. Many studies, for example, have indicated that children are a source of prestige in Mexican-American, Puerto Rican, Italian-American and Black-American communities. Among Black-Americans, efforts to limit family size are thought to be a conspiracy on the part of the power structure to engage in genocide if not culturecide.

Finally, what are the implications of family planning for women in the world? Obviously, for those women who live in cultures where a small family is valued for economic, religious or aesthetic reasons, family planning is desirable and should be encouraged. For the majority of women, however, who live in non-Western cultural contexts, it seems unreasonable to encourage them to limit their procreative abilities if this is accompanied by stress and anxiety associated with abandoning one's cultural values. At the very least, efforts to introduce family planning should be limited to those women in the modern sectors of the developed countries since such women have adopted corresponding modern values.

Ques. Does your society have some means of family planning, and what provisions are made for the aged?

Ans. One means of traditional family planning was sexual abstinence, which was practiced by both men and women. Sexual activity was considered a taboo once a woman was pregnant, until such time when the infant was weaned. This varies from one to three or four years. Although abstinence may have been practiced by the man as well as by the woman, there was a way in which a man could have his sexual needs met if he desired. Society permitted the practice of polygamy, and among a man's several wives there would always be a few who were not pregnant at the time others were.

Regarding the aged, our society's practice is not to ostracize them from their families and send them to a home for the elderly. We do not have such an institution. My belief is that to be sent to such an institution is to be stigmatized as useless, and for all practical purposes, dead.

Ques. In view of the importance of children and the preferred large family, is there any realization now that with a limited amount of food the more children there are the less there is for each?

Ans. My society does not consider the situation as such. We feel that the more children one has the more hands there are to work the land, and eventually the more food there would be for all to eat. This would be true in western industrial societies; it is not true in ours yet. We have not been able to accomplish this because we have had several natural disasters--droughts, floods, etc.

Ques. How do the African and other Third World countries view the motives of the U.S. in regard to population control?

Ans. We view such motives as culturecide, and perhaps genocide. Most Third World people do not understand the motives behind population control programs. These programs are viewed in a political way, with the belief that one does not give nor receive anything for nothing. There must always be a motive behind the action, implicitly or explicitly.

Ques. Will there be a growing change to western values or will African values remain traditional?

Ans. My society has a proverb--"Whoever leaves his traditions is a slave." Of course, attitudes vary from country to country. In most African countries about 95% of the population are illiterate. This means that many people still live in rural areas where traditional African culture still exists.

The adoption of western technology does not necessarily imply that Africans have to abandon their traditional norms and values. Japan can serve as a good model since it has become one of the fastest-growing industrial nations in the world, and yet still retains its traditional culture. Cultural values do not have to contradict each other; they can be complementary and create a new synthesis.

The obvious advantage of western culture is technology, but I am not as confident of the advantage of western values. In this country something called "quality of

life" is spoken of. It appears that that term denotes a life of great material things, which comes with economic affluence. When my society considers the quality of life we stress the quality of human relationships.

Ques. The government of Kenya has requested and received U.N. assistance in family planning. Are you in agreement with that government's position that family planning is indeed something necessary?

Ans. I am not saying that we should not have family planning. My stand is that those countries as well as individuals who need and ask for assistance should receive it. What I am against, however, is aid which is given with provisions, and most aid is given this way. Some governments have various means of coercing couples to have fewer children. While family planning might be necessary as a master plan on a worldwide basis, there are some individual countries in which I think it is not necessary.

Ques. You had mentioned earlier that there is no real starvation in Kenya, except in the northern part of the country because of the drought. Wouldn't there be serious famine if government aid were stopped?

Ans. We would still survive as our grandparents had, through subsistence living, if government aid were stopped. It must be remembered that the aid our country receives does not feed starving Kenyan families. Most of it is invested in technology which is in a sense a preparation for our future as an industrial nation. Are many aware that most of our agricultural and dairy products are exported to markets outside the country? Much of the assistance we receive is used to produce better cash crops, such as coffee and tea, for export. The foreign exchange we are given in return allows us to buy finished products from the West. The difference between the money we earn by selling our raw materials and that which we spend on finished products is immense! In the area of actual food production for consumption, most of us are still on a subsistence level.

Ques. Do you feel then that each country should support itself, and the U.S. should withdraw its aid?

Ans. The point I am making is that despite all of the technological knowledge the world has, developing nations are becoming poorer while developed ones are becoming richer. The gap is widening between both groups of nations. Something is wrong for such a situation to exist at this point in our world history. No nation can live in isolation among other world

nations. The question is not whether nations should or should not be involved with each other, but what kind of involvement should there be.

Ques. Do you think that the quality of life which Africa could offer to Africans without aid would be satisfactory to them?

Ans. Yes, positively. Do not confuse "quality of life" with "aid." The aid we receive to industrialize our country does not necessarily make our lives "qualitatively" richer. Technologically, our lives may be better, but we may have to sacrifice in certain ways. Consider the problems which industrialized nations have to cope with--ghettoes, pollution, high crime rates, human isolation. The African way of life is not lacking in "quality" and "meaning." For every traditonal problem we have had, we have also had a traditional solution. Our traditional life is one in which all human necessities for survival have been provided for; that is, everybody has a home in which to live, has enough to eat, and clothes to wear. These are human needs which are met in some way. Human wants are usually stressed in the western idea of "quality of life". This is the significant difference in our countries' conceptions of this term.

Ques. I think that the idea of stopping aid and moving back into a system of supernationalism overlooks some really significant alterations since the feudal period, and hopefully a certain kind of sophistication in our behavior has developed which embraces the world. Six per cent of we Americans consume about 30% of the resources of the globe, and with that kind of imbalance we cannot adopt the attitude of leaving the rest of the world to take care of itself. It is not possible for any country to do that, especially for one which has lived off the rest of the world. We need some modification in the aid which we give, but the notion that we ought to withdraw all aid is not realistic.

Ans. I agree.

Ques. You brought up the point that people's definition of the "quality of life" varies. I think part of the problem is that people's definition of overpopulation varies. Americans tend to think of population as people per square mile, and therefore look at other countries as being overpopulated. But in terms of use of resources and land, and resultant pollution, America is the most overpopulated country in the world.

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POPULATION AND ECONOMIC DEVELOPMENT

Andrew Leighton

I would like to talk about three basic issues which are popular discussion topics in terms of the relation between population and economic development. The first issue is a dispute in international circles which can best be described as a continuum with socio-economic development at one end and family planning at the other. The dispute concerns the allocation of limited financial resources in developing countries--if the final goal of development programs is a general improvement in standards of living, should funds go mainly toward population limitation through a family planning approach, or should a wide variety of socio-economic programs (health care, education, social reform, etc.) be emphasized? There have been individuals, especially in our country, who have advocated a family planning approach. Many philanthropists have donated millions of dollars exclusively to family planning. If we considered there to be a crisis in population 20 years ago, there is more of a crisis now. Many people feel that the most direct and easiest way to attack the perceived population problem is by family planning, by making means of contraception universally available. It seems, however, that the problem is more complex.

This type of approach could formerly be characterized by one American philanthropist, John D. Rockefeller, who recently gave a very important speech at the World Population Conference in Bucharest last August. Rockefeller was self-described as a person who for forty years gave literally millions of dollars toward a fairly limited family planning approach to solving the world's population and social problems. At the meeting in Bucharest with 130 or 140 nations in attendance, there were people waiting to more or less attack him on his stand, people who believe that his is a scheme for rich people to keep themselves in economically superior positions while keeping poor people, the "have-nots", in submission. As it turned out, in his speech, which is called the "I changed my mind" speech, Rockefeller said, "I changed my mind after forty years; I found that family planning is not necessarily the only way to stop population growth and to promote a more fuller way of developing human potential." He was saying that it is not that family planning programs fail, it is just that they are often instituted in relative isolation without other kinds of development programs. Or, more practically, the only time villagers would see a doctor was when the family planning unit came through. Rockefeller contends that family planning is still extremely important but that such programs must occur in a broader context, in a context of

social and economic development which includes, among other things, education for women and better health services to lower child mortality and increase life expectancy. So, the important thing is not only providing the methods of limiting family size but the motivation, as well. The first issue, then, is socio-economic development versus family planning.

The second issue of the three is one which has been discussed quite recently in economic circles in colleges and universities and not among the general public because it is academic in nature--zero economic growth. What is zero economic growth and what would it mean for a developed country like the U.S.? This issue is extremely complex and involves sophisticated economic concepts. Not all systems of the economy would cease growing; some would and others would not. Instead of dealing with this complicated issue in a superficial manner, I will refer you to my bibliography for detailed resources on this topic.

The third and last issue which I'll enumerate and then discuss briefly is certainly a pertinent one from our nation's standpoint--the presumed and actual effects of an extremely low rate of population growth, or of zero population growth, on our economy. By way of introduction, I think it is important for all of us to realize how close we are to zero population growth. To give a quick population history of the U.S.: The first census was taken in 1790. Ever since, fertility has declined constantly from an extremely high level (an average of about eight children per family), admittedly with the one exception of the post World War II baby boom which took place between 1947-1962. The most recent statistics available show that our total fertility rate is at an all-time low; it is lower than in the earliest periods of the depression in the 1930s; it is below replacement level. (Replacement level fertility simply indicates that level of reproduction at which the population will exactly replace itself--an average of slightly over two children per family.) The average family size in the U.S. at this time is slightly under two children per family; however, for reasons I'll mention shortly, this country is at least half a century away from zero population growth.

It has been alleged that zero population growth, or even a low rate of population growth such as we are now experiencing, will cause economic stagnation and catastrophe--whereas in actuality, there are definite economic benefits to be realized from periods of slow population growth. In order to take full advantage of these benefits we must understand our nation's demographic situation and appreciate the fact that the future should bring considerable changes in our way of life.

Ques. What do you as an economist foresee in the way of life style changes?

Ans. In terms of life style changes, Lester Brown, who was one of our U.S. delegates to the World Food Conference in Rome, said that the world is on the verge of one of the great "discontinuities" of all time. That is an interesting word, open to individual interpretation. What I take it to mean is that the patterns of living which have evolved during the last thirty years in this country are going to change quite rapidly. What is going to change? We can only guess at this time. The automobile is certainly going to change so that not so much energy is used. This individualized means of transportation in its present size and with its present wasteful internal combustion engine is just too much for our environment to bear. There will also be a change in dietary habits.

Some underdeveloped countries will realize the potential for development in an extremely short period of time through wise use of their resources, combined with measures designed to raise living standards. Again, it is important to provide people not only with the means of limiting their families, but with the motivation as well, through education and other forms of socio-economic development. This education should not only be in the classroom, but also in the form of exploiting other indigenous educational opportunities; for example, through agricultural extension services, literary training, rural apprenticeship programs, armed forces programs, etc. This should mean a tremendous need for teachers. Where do they come from?

Ques. Are developing countries for the most part now spending what limited financial resources they do have in ways which most effectively promote economic development and population limitation?

Ans. What is very difficult to understand is why a country like Pakistan spends half its national budget on military defense. But one can begin to appreciate the situation when the dispute over the Kashmir area with India is understood. In addition, because India developed a nuclear weapon, Pakistan must reciprocate. I am not sure what is going to bring people around. Certainly it is not the idea that people are starving to death--that has been going on for some time. The question is what is it going to take?

Ques. I think there is a very grave statement being made by some people, that money is going to solve all our problems. We are assuming we are the ones who can supply the teachers and the money. What we are forgetting about are the cultural attitudes of other

countries. We feel we can apply our solutions to everyone else's problems.

Ans. The biggest problem that has occurred in sending teachers overseas is a type of "cultural arrogance". Americans or people from the Western European countries have a difficult time adjusting to foreign cultures, but the fact that we are able to send teachers to these countries is something positive.

Ques. When these questions are considered--population and economic development--is the question of equitable economic development considered? You talk about per capita income which disguises many things. Many times people in a developing country are asked to sacrifice economically so that money can be built up to keep that country's economy developing.

Ans. We have gathered statistics from the Department of Commerce that the average income in this country is increasing by X% per year, but this simply does not apply to the poorer sections of our country. Although their actual level increases, in a relative sense they are still close to where they started out 20 years ago. Another issue is how can this growing disparity of income either between rich foreign nations and their poor neighbors or within one nation be justified? How much longer can we increase this separation? That is exactly what is happening in terms of world population growth. The richer countries' population growth has slowed or stopped and these nations are getting richer. The poorer countries' population growth is increasing and these countries are getting poorer.

Ques. I have read that one reason why some developing countries have had such high birth rates is because they were at one time colonial. The economics of this situation, for reasons I am not familiar with, caused them to have high birth rates. Before we blame developing countries for their own cultural practices we should look back at our own earlier life style.

Ans. I agree. A relative point could be made along these lines. The international boundaries in Central Africa, for instance, were drawn according to the whim of Belgian entrepreneurs looking for rubber. Belgium spliced through whole tribes and cultures, sorting them into different countries. Oftentimes we have to look deeper than the surface of things and must consider the history of a situation to understand the direction of historical development.

Ques. Are we ever going to run out of any natural resource?

Ans. A study has been done by MIT called Limits to Growth. It is a computer study in which five variables were combined and extrapolated into the future in a number of different simulations. The variables included were industrial output per capita, income per capita, population, pollution, and resources. The conclusion of the study was that our society could not sustain itself under present levels of population and economic growth until the year 2100, even with improvements in technology. However, the study has been widely criticized. It is said that the people who conducted the study were too pessimistic in their assumptions, and so the study merely reflected this attitude.

Regarding the possibility of our running out of materials, one argument states that as a resource supply becomes smaller the resource becomes more expensive, and because this will limit consumption we will never really "run out" of anything. We will stop using certain resources because for one reason or another they will become too difficult or too expensive to bring out of the earth, and we will have to switch to other kinds of resources. The point is, however, that with rapid population growth we tend to limit our long-term options and formulate the most immediate solutions to a number of problems, the long-term effects of which we do not always realize.

Ques. There is a much more local problem in New Jersey which is that certain very basic resources which we have assumed to be free resources, such as water, are in jeopardy. Industry has felt for many years that any body of water was the place to dump its sewage, and at the same time some people farther down the stream thought it was a free place to take their water from without having to pay for it. All that was needed was to add some chlorine to it. These resources are in the hands of so many different people. There is just beginning to be a system of identifying the total resource. For example, we are beginning to collect data on the Passaic River Basin which will help us to regulate the uses of it.

As the population grows too fast in northern New Jersey we will have a water crisis. The area will go from having free water to some really ridiculous situation such as having to get its water supply from upstate New York.

Ans. I would like to make a quick point which I have neglected. That is, I have talked about how slow

our population is growing in the U.S., which is true. But we should keep in mind that parts of this country have high growth rates, other parts are growing more slowly, while some areas are declining in population. To say this country's population is growing slowly means it is growing slowly as a whole, while some of its segments are experiencing rapid growth or no growth at all. Many people do not realize, for instance, that the mid-western section of the country is experiencing a problem of depopulation.

Ques. We were talking about immigration before and one of the things that troubles me about northern New Jersey is that it is attracting people from other countries and other states, who are coming in more or less illegally. This has happened because we have opened the door to substandard housing. As we become richer and other countries poorer, are we not going to have an attracting place for the underprivileged of the world?

Ans. That is a tremendous issue. It is going to become more critical politically as a lower birth rate elevates it to a more important factor in our annual population growth. Some people have already advocated stopping immigration completely. In September of 1973 the New York Times Magazine carried an article by Leslie Westoff entitled, "Should We Pull Up the Gang Plank?". The article raised the possibility of stopping immigration completely because of the extent to which it increases our population. This is a complex political issue.

Ques. Perhaps life for the immigrants is better where they came from than it is here for them.

Ans. I don't know. In one volume of the Commission's Report there are statements from illegal immigrants. There was a case in which twelve Mexicans were found crowded into the central container of an oil tanker. The tanker came from a city on the other side of El Paso and was traveling to Chicago, which would have been its first stop. The Mexicans paid $300 each for the ride, and they rode in 4 to 6 inches of oil so that when the tanker stopped for customs the driver could turn on the spigot and bluff a full tank of oil. Life is better for these people here, even living under poor conditions, than it is in their homeland.

To answer an earlier question on age structure, consider this diagram on the board as the population of a country. On one side are males and on the other are females. The horizontal axis represents the percent

of the total population. The vertical axis represents age--the higher up the pyramid the older the population. A bulge or irregularity in population occurs when an event like a war takes place. In the Soviet Union there is a tremendous dent in the male side of the population because of the many men killed in WW II. In our own population there is a bulge which reflects the WW II baby boom. In order to get zero population growth this bulge must move up into the reproductive age, and that is what is happening now. Those people who were born between 1947 and 1962 are now passing through their reproductive years. They are marrying and starting to have children. Even if all of these people reproduce at a replacement level, we would have to wait from 65 to 70 years for ZPG to occur. That is how far we are away from ZPG at the moment.

There is another way to illustrate the baby boom: consider two periods in American history--the period from the end of WW II to 1965 and from 1965 to 1985. We know how many 20 year olds will be in these segments because they have already been born. So if we look at these two 20-year periods, and look at the people who turned 20 years old in each, we will see that in the earlier period 48 million turned 20, while in the later period 78 million turned 20. That is what is meant by a population bulge. These people all have the potential to marry and to have children. Population "momentum" has been built up by the WW II baby boom. Even if we continue the present extremely low level of fertility, which itself is unlikely, ZPG is still at least a half-century away. It is impossible to predict future trends in the birth rate. It neither consistently follows nor precedes economic indicators--although generally in prosperity it goes up. There are many other issues which are at least partial causes of today's low fertility: legalized abortion and widespread use of contraceptives certainly play a part, along with changing lifestyles and women's liberation. We cannot really say that the economic crisis is responsible for the decrease in the birth rate.

I would like to talk about the relationship between ZPG and the economy. Traditional attitudes in this country center around the growth mystique. Whenever we have had population growth we have had economic growth; therefore the two have been causally linked. Many believe a decline in population growth would mean economic stagnation, that the economy would cease to function. The demographic realities are that with a decline in population growth the work force would become older; there would be fewer young people in the population. But many take this to mean that because of its increased age the work force

would be less imaginative, less open to change. These are traditional criticisms of a slow rate of population growth. A more realistic view is that if we had ZPG in the U.S. the average age of the work force would increase from 27 to 37. Claims that an older labor force would be less innovative are simply not based in fact; it is impossible to make generalizations like that. There are certain countries which are at or near ZPG today and which have extremely high rates of economic growth. West Germany, an economic giant, has one of the lowest rates of population growth in the world.

We cannot make generalizations about an older or a younger work force. Technological advance, which is so characteristic of our country, works both ways in the face of ZPG. It works positively for the older members of the labor force in that the superior physical attributes of the young are less important. It becomes more important to have skills than to have strength. It works against the older labor force in that workers in a society with increasing technology need more training. Older people sometimes have a difficult transition back into the educational system because of their own attitudes, and the lack of adult vocational training centers in this country.

So ZPG means there would be a somewhat larger work force, composed of people over 15 and under 65. Those over 65 and under 15 form a dependent population which must be supported by the rest of the population. A slower rate of population growth means more people are earning and less people are in the dependent age categories. Regarding per capita income, assuming efficient current utilization of our recources, there tends to be a higher per capita income with a slower rate in population growth.

Ques. I may be misunderstanding this. I remember reading that as the population growth comes close to ZPG the age of the work force increases, and because we have high life expectancy there will be more people in the over-65 age bracket. I am thinking now of social security--aren't there less people working, trying to support more people as the older population becomes larger?

Ans. You are correct in the sense that the number of older people is constantly increasing and that expenditures to social security will also have to increase. The number of people added to the social security system would not be more than the number of disadvantaged youth in the under-15 age category that would occur in a fast growing population. To explain more clearly I recommend the Report of the Commission on Population Growth and the American Future. So it is

generally accepted that a lower rate of population growth means a higher rate of per capita income.

I would like to make three points: (1) Instead of thinking about socio-economic development versus family planning, we should think more about socio-economic development and family planning. This is not an "either,or" situation; these two concepts must go hand in hand. (2) In the U.S., according to present trends, ZPG is about 65 years away. This is calculated by the present birth rates, which unfortunately are never stable. We know birth rates will change; the question is, how will they change? If they remain the same it will take us at least half a century to reach ZPG. All these statistical projections ignore immigration, which accounts for about a quarter of our annual national population growth. (3) Probably the most important point is the relationship of ZPG and the economy. I am trying to dispell the myth that ZPG means automatic stagnation or economic decline. ZPG would mean much more spending power for the individual, assuming that we make prudent use of the resources we have available. Unfortunately, we are not doing that at the moment. Most of these conditions represent a kind of new morality, which Dr. Burke referred to as, "the basic restructuring of human values." That is what this is all about. We can see that in this country it is not rampant population growth that is causing problems, but rather the inequalities of population distribution (three-fourths of our population live on 2% of the land), and our affluent life styles.

After two years of studying the possible effects of different rates of population growth on our economy, the National Commission on Population Growth and the American Future concluded: "We have looked for and not found any convincing economic argument for continued national population growth. The health of our economy does not depend on it, the vitality of business does not depend on it, and the welfare of the average person certainly does not depend on it."

Ques. I would like to discuss the third point. It seems to me that if we are going to have an increase in population which is already more or less predicted in the next 65 years, then we may have a shifting into another kind of economy, a goods oriented economy, in which it will become more expensive and more difficult to have goods of any kind. We could have a continuing growth in the gross national product and still not have more goods because the gross national product is made up of both goods and services, and in a crowded society it is more likely that people will begin to pay for experiences rather than goods. For example, experiences which were formerly

free to people, such as going into a wildlife preserve or canoeing a river, will have a price. Because of an increase in population and so a greater demand for the same experiences, we might have to apportion time in the wildlife preserve or on the river, and make these experiences into services.

Ans. That is an astute observation. That subject is talked about a great deal in the Commission's Report--the trade-off between goods and services. The part of our economy which should always continue to grow is the service sector. Other sectors of the economy, such as manufactured goods (automobiles, housing units, etc.), will expand or decline, depending on the level of demand. The concept of GNP poses certain problems--it would be better if we could come up with a somewhat different measure of total economic activity because GNP has become the standard of life. GNP is simply the sum of all the goods and services that are produced in a year. It does not tell us about what economists call "external realities" or "social costs," the smoke that comes out of a stack and ruins someone's laundry.

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Comprehensive review includes discussions of past, present and prospective population growth, world-wide fertility, momentum of growth, age structure, migration, urbanization, ideological positions on population growth, policies and programs of major governments, institutions and religions, family planning systems, current means of contraception, a glossary and bibliography.

Berelson, Bernard (ed.) Population Policy in Developed Countries. New York: McGraw-Hill, 1974. 793 pp. Hardcover. LC 73-18368 c.i.p./25. ISBN 0-07-004833-4.

Reports on the demographic situation and the policy response in 24 developed countries that together constitute about 95 percent of the population of the developed world by specialists of these nations.

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Series of readings for studying national population in a social studies context; clear explanations of a variety of population processes are developed through text and visuals. Sample units include the subjects of childbearing, migration, health, urbanization, rural depopulation, minorities, education, and human resources.

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Contains papers presented at the third annual review conference conducted by the Caltech Population Program; focus of this volume is the general topic of population pressures, perceptions and policy (Population: Perspective 1972 - focus on internal and international migration; Population: Perspective 1971 - focus on attitudes toward population limitation). Excellent detailed examinations of specific region and country population situation and action.

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Established in 1969, the Commission made a two year study of current and projected population trends in the United States, and the impact of those trends on the economy, government, education, immigration, resources and the environment, human reproduction, population policy, and population growth and distribution.

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Occasional monographs describing the social, economic, and demographic characteristics of selected countries and the nature, scope and

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Clear, simple, comprehensive explanation of the characteristics of population change and why rapid growth presents a variety of social, environmental and individual problems; many photographs, drawings, also sections on how to read tables, definition of terms, and bibliography.

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U.S. Department of Commerce, Bureau of the Census. A Census Portrait of ... Washington, D.C.: Social and Economic Statistics Administration (Publications Distribution Section) January, 1974. 52 four-page leaflets. Paper.

Basic demographic data according to the 1970 census for fifty states, District of Columbia, and Puerto Rico; information includes population by age, sex, race, marital status, income, schooling, occupation, housing, farming, and state map divided by counties showing population concentration.

U.S. Department of Commerce, Bureau of the Census. Pocket Data Book USA 1973. Washington, D.C.: U.S. Government Printing Office, 1973. 368 pp. Paper. LC A66-7638. GPO S/N 0324-00109

U.S. Department of Commerce, Bureau of the Census. The Population of the United States Trends and Prospects: 1950-1990. Washington, D.C.: U.S. Government Printing Office, Series P-23, No. 49, May, 1974. 221 pp.

In-depth demographic information based on current data and projections to 1990; subjects include components of population growth, composition, distribution and internal migration, the labor force, projections, and summary with socio-economic implications.

II Population Education

Horsley, Kathryn, et al. Options: A Study Guide to Population and the American Future. Washington, D.C.: Population Reference Bureau (1755 Massachusetts Avenue N.W.), 1973. 75 pp. Paper. Free. High school, undergraduate. LC 73-87591.

A collection of teaching activities and suggestions based on data from (and including a summary of) the National Commission Report; of special interest are the educational goals and

skills (pp. 20-21). Potential activities include student autobiography, pressures towards marriage and childbearing, the mystique of growth, immigration, resources and the environment, human reproduction, non-growing populations and population policy; a lengthy bibliography (books, articles, audio-visuals) is included.

Interchange, Population Education Newsletter. Washington, D.C.: Population Reference Bureau (1755 Massachusetts Avenue N.W.), bi-monthly.

Paper. Teachers, curriculum supervisors, administrators.

Primarily for middle and secondary school teachers, the newsletter is designed to: (1) promote understanding of current population trends and issues; (2) provide information on training opportunities and teaching materials; and (3) outline instructional activities useful in the classroom for illustrating population concepts.

Marden, Parker G. Population Workbook: A Series of Learning Exercises in Population Studies for Undergraduates. New York: Learning Resources in International Studies (60 East 42nd Street), 1974. 56 pp. Paper. High school, undergraduate.

Thirteen exercises designed to introduce students to some of the important methods used in demographic analysis as well as some of the current issues in the field of population study.

Marden, Parker G. (ed.) Teaching Notes on Population. New York: Foreign Area Materials Center (State Education Department, 60 East 42nd Street), quarterly. Paper. Free. High school, undergraduate.

Designed to strengthen population studies in undergraduate education by sharing information about and experiences with materials and ideas useful in teaching; past issues have contained teaching modules, evaluations of textbooks, and descriptions of the effectiveness of various teaching units.

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Articles explain the theoretical basis for both the content and ideological approach to population in the United States; the section on sources includes comprehensive annotations of teacher and student material, written and audio-visual.

III Reports on Bucharest

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Special issue of quarterly international magazine on the World Population Conference and the Population Tribune.

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Summary and assessment of the August, 1974 United Nations World Population Conference and Population Tribune in Bucharest, Romania; contains a comparison of the draft and the final World Population Plan of Action.

United Nations. Department of Economic and Social Affairs. Concise Report on the World Population Situation in 1970-75 and Its Long-Range Implications. New York. 1974. Paper.

Contains information on world population and its relation to fertility, mortality, migration, school enrollment, urbanization, economic development, and age structure; long-range implications of the current demographic situation are also discussed.

United Nations. Center for Economic and Social Information. Development Forum. Geneva (Palais des Nations, CH-1211 Geneva 10), Vol. 2, No. 7 Sept., 1974. Paper. Free.

Special issue of monthly international newspaper on the World Population Conference and the Population Tribune; a generally useful source of information on international development.

United Nations. Centre for Economic and Social Information. To Promote Human Welfare and Development, A Digest of the Basic Developments Prepared for The World Population Conference. New York, 1974. Paper.

Contains summary of papers from four United Nations symposia: population and development; population, resources and the environment; population and the family; population and human rights.

IV Economic Growth

Daly, Herman E. (ed.) Toward a Steady-State Economy. San Francisco: W.H. Freeman and Co., 1973. 332 pp. Paper. LC 72-5710. ISBN 0-7167-0793-4.

Collection of readings emphasizing the conflict of economic growth with biophysical limits; social constraints and problems in the transition to a steady-state economy; and consideration of ethical issues of the steady state.

See especially Boulding (pp. 121-132) and Daly (pp. 149-174). Boulding stresses the finite "closed" nature of the earth, and defines his "cowboy economy" ("reckless, exploitative, romantic" ways of the past) and "spaceman economy" ("limited, finite" lifestyles of the future). Daly discusses "growthmania" - growth for growth's sake.

Meadows, Donella H., et al. The Limits to Growth, The Report for the Club of Rome's Project on the Predicament of Mankind. New York: Universe Books 1972. 205 pp. LC 73-187907. ISBN 0-87663-165-0.

Five variables were combined and extrapolated in computer models which predict disaster if present trends in population and consumption continue. Criticized for pessimistic assumptions, and for "garbage in, garbage out" nature of computer models.

POPULATION AND ETHICAL VALUES

Stephen Viederman

Clearly, virtually everything we do and say consciously and unconsciously is involved with a value structure. The word "over" that we hear so much in front of words like population and crowded is clearly a "value laden" term. "Overpopulation" is simply what I think it to be.

What I think desirable in terms of population and what you think desirable are probably very different kinds of things. We have to realize that whenever we are talking about values in a classroom we are concerned with value education. There are certain irrefutable facts--the world is growing at a rate of about 2% a year, and if this continues we will double our population in 35 years. The choices I make in using these facts, simply because we cannot report every fact, are value decisions. Do any of you know what proportion of population growth in a particular year comes from immigration into the U.S.? It appears that 20% of American population growth each year in the last 30 years, roughly 400,000 per year, is the result of legal immigration. (A total of 2 million is added to the U.S. population each year.) We must also remember to add illegal immigration, which some people estimate to be an additional 600,000 per year. Is this a good or a bad thing? If we go back in our own history, remembering the phrase at the bottom of the Statue of Liberty, we will see that we are concerned with a set of values.

What should be done? One possibility is that if we feel the U.S. is "overpopulated" we should put an end to immigration. But what does this mean in terms of traditional American values, the "land of opportunity"? We are back again to a question of values.

We often hear discussion of optimum levels of population--the population of the U.S. at the moment is about 212-214 million people. Are we "overpopulated", is this the right population, or are we "underpopulated"? Who is to decide, on what basis? Can we make a basic decision on this at a national level? We hear such talk about the issues of family planning and genocide in some elements of the black and minority communities and from native Americans. From their point of view perhaps America is "overpopulated" with white middle-class Americans, but "underpopulated" in terms of blacks and other minorities. Again, how do we decide what is optimal in population?

Considering the issue of where one wants to live, there are advantages and disadvantages to both the rural and urban areas. Those who live away from the city are optimizing certain things--it is usually safer, there

is a great degree of freedom to move about, some say there is more friendliness. But to live in the suburbs is to give up certain goods and services, certain schools and medical facilities, to name a few things, which are a product of the scale of the large city's economy. Despite the glorification of the rural area it is a fact that 75% of Americans live on roughly 1½% of the land. The urban centers are the places where most people apparently want to be.

I think it is important for us to remember that population changes through three processes and only three: 1) fertility 2) mortality and 3) migration. I say this because if one were to read the popular literature one would get the mistaken impression that there is only one problem--that is growth, and according to this literature it seems to occur because of increased fertility. (In reality fertility has stayed the same or declined, but growth has resulted because mortality has declined faster.) The fact is that the problem is not only that of growth. Populations grow, but at different levels of aggregation they stabilize and in some cases decline. In trying to define the problem of population we have to define where the learner is at a given time. How many of you have seen The Last Picture Show? Did many of you think of it as a population film? This film shows an example of one of the most serious population problems in the U.S. today--the problem of decline. The Census Bureau after the census in 1970 put out a map showing the U.S. by county and year of highest population. What it shows is surprising--there is a group of well over 100 counties that had their highest population in 1900 or before. In the period between 1960 and 1970 half the counties in the U.S. lost population.

When we think about population problems we tend to think of growth problems. We fail to take into account the fact that if one happens to be living in that particular county in Kansas which is declining in population, one's perception of population problems is quite different from that of the person growing up in the urban megalopolis area of New Jersey. I want to emphasize that populations grow, stabilize and decline depending on the level of aggregation.

I think that one mistake we make is to start off with the assumption that we know what the population "problem" is. This is unfortunate for two reasons: first, elements of the problem are not clear enough, particularly when we consider the consequences of

different forms of population change, especially on the local level. Second, as educators we lose the value of problem definition in the educational process. The issue of problem definition I think is exactly where we enter into the realm of values. What is a problem? First there must be some kind of ideal, some standard of what one would like the world to be like. The second part of problem definition is an empirical description of the reality in which one finds oneself. The distance between the reality and the ideal is the problem, and population problems are that portion of the total problem that can be identified with population processes (fertility, mortality and migration), and population characteristics such as sex, population distribution, educational levels, etc. This process is an essential one if we are seriously concerned with problem solution.

An example of the importance of problem definition, regarding the world food crisis, was the discussion at the World Population and Food Conferences in Bucharest and Rome on the relationship of population and food. I think we have to distinguish between short-term and long-term solutions to problems. If we are concerned with the short-term solution to the food problem, population is not a fundamental issue. There are very few things we can do in a short time to deal with population processes to make the food distribution better. A point of fact--if the U.S. continues its present levels of fertility of slightly under two children per family it will take approximately seventy years for us to achieve zero population growth, because all of those babies who are now born will have to have their two children and the age pyramid has to work its way through until something like an age-rectangle appears.

Another example of the importance of problem definition and problem solution relates to values. If the American population were asked a true or false question such as this: poor and black people are responsible for population growth in the U.S.--the answer would probably be "true" for 60 to 80% of the population. The answer is actually "false." Population growth in the U.S. has resulted from white middle-class Americans. Unless one looks at differential fertility rates one does not come up with solutions that are viable.

Still another example concerns the issue of environment and pollution as they relate to population. My office is on the 40th floor of a building in central Manhattan. Most of the time as a result of pollution levels it is very difficult for me to see up to Central Park and certainly to the George Washington Bridge. During the taxi strike a few years ago it was surprising to me that the visability was considerably better.

The population did not change. One then starts questioning the issue of consumption and technology as related to pollution. My story is an anecdotal way of pointing out again the importance of problem definition as a way of isolating the variables in order to come up with some sort of viable solution. The answer is not necessarily decreasing the number of people in N.Y.C., noting that N.Y.C. has not grown during the last two or three census years, but rather in dealing with consumption-technology issues--our reluctance to use buses rather than cabs and the inadequacies of the internal combustion engine. There may be many reasons why one wants to deal with population issues in this context but it is not necessary to reduce population in order to accomplish a likewise reduction in pollution.

Now that we have defined that problem, the next issue is the role of values in dealing with the solutions to these problems. For example, today the question was raised about the vasectomy camps in India. It was suggested that people would consent to having vasectomies by being promised a transistor radio. Is an incentive such as a transistor radio, or to put it differently, is a one-dollar incentive coercive if a person is making one hundred dollars a week? We then go to the next stage and ask, is a ten-dollar incentive coercive? Are one-hundred or one-thousand dollar incentives coercive? The argument is made that the person involved is bettering his life by accepting this arrangement. But the other argument also may be made: does he have a choice when his income is tripled, particularly when he does know the full consequences of his action? The issues are complex and have to be looked at within a cultural context.

Four values that have been isolated as potentially important in analyzing population policy prescriptions in the U.S. are traditional American ideals of freedom, justice, the general welfare, and security and survival. Those of you interested in this particular question should refer to the item on the bibliography which is the Task Force Report for the U.S. Population Commission on "Ethics and Values and the American Tradition," which talks about these particular values and relates them to a whole range of population policy proposals.

Related to this is the value of responsibility to present and future generations. If you are the president of Bangladesh at the moment where starvation is real, do you put what is by necessity a limited budget into gruel kitchens, inadequate though they may be, in order to maintain the lives of those who are there, or do you put that portion of the budget into family planning and population programs, which are more related to

future than present generations. I don't have the answer to that question but I suggest that it is one of the complex issues one has to face.

Furthermore, in a society like the U.S. we have to realize that we are not talking about a homogeneous society. We have already referred to the different attitudes of native Americans, Blacks, and Chicanos, among others.

Certainly there are different views among religious groups. Religious issues relate to contraception and certainly abortion. In talking about population issues we have to try to avoid the oversimplification about broad aggregates as though they really represented the group to which we are dealing. I think this means that we as educators have something that is increasingly difficult to do in programs that are often centralized, and that is to start where the learner is. Going back to The Last Picture Show, the perception of a problem is related to the values of the person involved. A student in central Kansas, for example, would bring to the population issue a different set of values than the child from the black ghetto of Newark. We must begin with a recognition of the different values and different perceptions involved or the issue is lost at the beginning. I think the issue is obviously one that cannot be value free. Any selection of facts and data are bound into one's unconscious or conscious understanding of the problem, but we can try to be value fair in the sense of presenting a range of views, and assisting the individual in the process of exploring his or her own values.

I think the biggest problem is what I would call "unconscious bias." I received in the mail recently a curriculum outline on environmental education from the state of Indiana. I was struck by the fact that one of the concepts they are trying to teach is something that is relative. They state they want to "illustrate how population concentration can affect pleasures coming from the leisure time activities of camping, hiking, sports, etc." I would argue that there is an anti-urban bias in this statement, because my particular pleasures, and I happen to be an urban person, are urban-related.

I am trying to emphasize that we have to start raising to the level of consciousness many of our unconscious biases. We also have to develop in our students a healthy skepticism of "facts." One example is the reporting of the New York Times on the population conference held in Bucharest. I found the Times clippings on my desk when I returned from the Conference. Clearly

my perceptions of what happened there and the perceptions of Gladwin Hill, who was the New York Times correspondent, were very different. The Times' editorializing, which represents one particular set of values, stated that the Conference was made up of a lot of talk or "demogogery," as the word was used. This perception is different from the perceptions I have of the benefits of the Conference. I am not necessarily saying that the Times is wrong and I am right or alternatively, but I am saying that I think we have to assist ourselves in being skeptical of the things which purport to be scientific.

I could give you a list of quotes related to the food issue; I suggest for example Paul Erlich's classic book, The Population Bomb, which is a superb exercise in working with the classroom on values and how value issues may get in the way of the understanding of science. I may also suggest that you who have not read "The Tragedy of the Commons" by Garrett Hardin, might look at the BSCS film version of it, which is remarkable and extraordinarily useful in bringing out the value issue of population. Just one example I will give--there is a scene in the film in which the narrator is saying "I have a gun, it is mine, therefore I may use it." There is an explosion, the screen goes white, and the next scene is that of the birth of a baby. It is interesting that the baby is black; there are values in mind. In both cases above the authors are respected scientists who have, in my view, gone beyond the boundaries of their science, and what is known, and have become polemicists. This makes their work, in the hands of a knowledgeable teacher, useful in training properly sceptical minds.

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GENERAL SESSION - POPULATION EDUCATION

Stephen Viederman

I would like to begin by giving what I believe to be a viable definition of population education. Firstly, population education is relevant education, relevant not only in the sense of being timely, but also in the sense of having a long-term importance since it is a preparation for the future. It is interesting to note that the first call for population education in the U.S. came in 1943 with the population at 135.7 million. The problem as then defined was not population growth as we now view it, but population decline, as addressed in a pamphlet by the National Education Association. The "baby boom" has since put an end to that. Certainly, population education would have relevance under any circumstances.

Secondly, population education is problem-defining education. It is concerned with phenomena which manifest themselves at all times and which are concerned with people. Populations grow, stabilize and decline--we must look at all of these aspects of populations and not simply assume that the only problem is that of growth. Population education is a part of population policy, both in the U.S. and overseas, but it also can be looked at as part of education policy. It will change with and effect change within the educational system by focusing on another aspect of population education, namely, the concern for values.

Population is both a substantive and value area. Procreation, consumption, migration and distribution are private acts, but they are acts which have both private and public consequences. Because of this fact the individual's relationship with society is a crucial one, and it must be considered in any population education program.

Most of us here are concerned with school education. I think it is important to emphasize as Dr. Burke did that population education and environmental education are not synonymous with schooling. Education, and learning in particular, takes place in a variety of settings, some planned and others unplanned. As educators in developing programs we first have to define what we can legitimately and relevantly do within our own education system, and also what the system will bear. We must look at what is being done through educational television programs, the girl scout and boy scout groups, etc. Hopefully, in the process of educating the students

we will also be indirectly interacting with their parents.

Beginning with the assumption that no education can be strictly value free, and that education programs and the selection of facts in these programs are based on our own value frameworks, I would argue that population education should at least be value fair. We should try to view the learner as an inquirer, and not adopt the attitude which some more activist organizations have of imposing values upon others. Such a form of imposition can reach the point whereby the right answer to a question such as, "what should the ideal family size be?" becomes "a two-child family." We should instead [illegible] a more open-ended and less conclusion-oriented [illegible] of education.

A better definition of population education might be as follows: first, it is an educational process in which the learner is helped in understanding the causes and consequences of population phenomena for himself and his community. Second, it assists the learner in defining for himself and his community the nature of problems associated with population processes, which include fertility, mortality and migration (and we tend to forget the latter two in popular discussion), and population characteristics--age, sex, marital status, education, ethnic groups, etc. Third, and most important, population education is an educational process which assists the learner in assessing the possible ways which the society as a whole and the person as an individual can respond to and influence these operations. The emphasis here is not only on present generations but also on our relationship to future generations.

For a good discussion of the goals of population education, I would refer you to the collection of teaching activities in Options: A Study Guide to Population and the American Future. There is an assumption on many people's part that population education is population control education, which strives to influence people not to have more than two children. The book mentioned is useful in that it underlines the openness which a good educational program must have in dealing with popular conceptions regarding population. The goals, as stated in the book, are to assist the individual in understanding how population processes affect him, how his own actions affect the society as a whole, and to help him in acquiring some knowledge of the basic processes of population. He will be able to evaluate what actions might be taken in order to be, to use the words of Dr. Burke, "a socially responsible individual." This I think is the main concern of population education.

Horsley, Kathryn, et al. Options: A Study Guide to Population and the American Future. Population Reference Bureau, Washington, D.C. (esp. pp.20,21)

Godfrey Roberts

I would like to discuss some of the concerns which Stephen Viederman expressed in attempting to define population education, and look at the identifiable approaches to population education which exist.

One such approach is by value inquiry. In this approach the learner is presented with alternate viewpoints, and is given a set of guidelines by which he may make informed choices. The basis of this idea is the large volume of information which is available in the area of inquiry. Two important contributions in the area are the curriculum material which Byron Massialas and John Zevin have developed, and Jack Nelson's book, Population and Survival.

Another approach to population education on which Stephen Viederman has worked is one which begins with the immediate environment of the student, and then focuses on the concerns of the community, society, the nation and the world.

A third approach is that suggested by David Burlson at UNESCO which states that population education should consist of three areas of concern: 1) population dynamics, i.e., demographic education, 2) family living, and 3) reproductive education. Burlson suggests that value analysis should be discussed in all three areas of concern, and these areas should be included in the broader sphere of environmental education.

The fourth approach is the Asian Regional UNESCO definition of population education, "...the purpose of developing in students rational and responsible attitudes." This definition of population education implies a value position. Once a responsible attitude is determined, students are taught to develop an awareness based on an established position.

Another approach to population education is purely a demographic approach, i.e., citing only demographic changes without including other aspects of population. Many South American countries' population education programs are simply demographic education. Because of cultural and religious constraints it is sometimes difficult to develop all areas of concern of population.

The last approach is the population-environmental approach, which is fitted into a broader framework of environmental education. Such work, which is being done at the University of Delaware, uses a broad conceptual scheme, in which man is a part of the natural system and is subject to its limitations.

I would like to raise one other question that as teachers we should consider, which is how we should introduce population education into an existing program. Three different approaches are: 1) introduce a course in population education, 2) introduce a unit of the subject (these two approaches have significant problems because most teachers are teaching an already overcrowded curriculum and developing any new unit becomes a problem), 3) infuse population concepts into the existing curriculum. This has been attempted in some countries with considerable success.

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Jack L. Nelson

I would like to conclude our general session on population education by mentioning the one word which may have been used more than any other in the conference--values. There are current educational problems which seem to illustrate the very things about which population problems are centered. Curricular and instructional problems are value problems. Regarding population education, there are value problems as to where a program should be included in the curriculum, why it should be, and instructional concerns as how does one teach it if one wanted to. So curricular choices are value choices, as population itself is a values problem depending on where in the world one happens to be.

Besides realizing that population is a values question, we should also know that it is non-disciplinary. It is not only a social studies question as many seem to think, but it also involves science, literature, vocational subjects, and physical education. It is impossible to deal with population as a purely historical problem, a natural science problem, or a sociological problem. It embraces all of these areas.

Another aspect of the population problem is that it is non age-specific. Since everyone is involved in some population sector at every time of one's life, population education should be considered an on-going educational experience.

The basic purpose of all education is to assist students in developing the means of rational decision making. It is the responsibility of the schools to provide assistance to students in examining whatever factual data and viewpoints of knowledgeable people are available in the field. Students should also be offered the opportunity to raise and test their own hypotheses.

Barry Commoner

There are several facts regarding population which are clear: the population of the world is getting larger, and this process cannot go on indefinitely because there are limits to the resources, for example food, that are needed to sustain life.

Like all living things, human population has a tendency to grow exponentially. In an exponential relationship any given event has an influence on subsequent events. Every new generation of children will produce a larger future generation. In contrast, the supply of resources such as fossil fuels is limited. Even something that is produced cyclically--food--is limited because there is no evidence that every unit of food produced brings forth the production of more food.

These facts constitute the Malthusian idea, which is that since human population rises exponentially, and a resource such as food rises linearly, eventually there will not be enough resource to support the population. This is a scientific fact, and one which everyone who is concerned with population can agree is true. Some details regarding population can be argued; for example, how fast various populations are growing. The fact, though, that the growth of human populations is exceeding the production of resources needed to support it is a statement which no one can successfully dispute.

When we proceed from that simple statement in trying to analyze the problem, and begin to determine what forces are involved, the problem becomes extraordinarily complex. The simple statement--the limit to the growth of human population is imposed on it by the inherent limits of the earth's resources--is a useful idea but it is abstract.

One of the first errors we make is to view population as a global whole, whereas actually the problems of population are different in various parts of the world. To view the problems realistically it is necessary to determine the causes of the discrepancy between the rate of population growth and the available resources. The current views being expressed are neither simple nor unanimous. I would like to present several different ones.

One view is that since population grows through a biological process, the fertility of human beings, the only way to bring about the cessation of growth is to control fertility by various methods. I must note here that I think the question of population control is a matter of civil rights. The issue is simply whether human beings have the right to determine for themselves how many children or how few children they will have. My position on this issue is that contraception is a civil right that any human being ought to have and it is as important as any other civil right.

However, the issue now being considered is another aspect of population control which is a social process, the governance by society of the process of reproduction, the control of the population of a nation.

One approach to the problem of overpopulation is family planning. This is the most gentle way of guiding people into self-limiting their families, by educating them as to the problems of overpopulation and providing contraceptive information.

There is another position which holds that people should be legally forced to regulate their fertility. I would like to quote a statement from Kinsley Davis on this view: "If people want to control populations it can be done with the knowledge already available. For instance, a nation seeking to stabilize its population could shut off its immigration and permit each couple a maximum of two children, with a possible license for a third." (1) This is simply a legal statement of what one is allowed to do, and this is obviously a way in which the population can be controlled.

There is a third approach which states that if among nations there is a nation or group of people which is unwilling to regulate its own population in the face of diminishing resources, then other nations should coerce or enforce a limitation on that population by withholding food and other support. This is the so-called "lifeboat" ethic. The statement of the ethic, from Garrett Hardin, reads, "So long as nations multiply at different rates, survival requires that we adopt the ethic of the lifeboat. A lifeboat can hold only so many people. There are more than two billion wretched people in the world, ten times as many as in the U.S. It is literally beyond our ability to save them all. Both international granaries and lax immigration policies

must be rejected if we are to save something for our grandchildren."(2)

That statement has behind it a view which is even more explicit. Again from Garrett Hardin, "Every day we Americans are a smaller minority. We are increasing at only 1% a year while the world increases twice as fast. By the year 2,000 one person in 24 will be an American. In 100 years only one in 46 will be. If the world is one great commons in which all food is shared equally we are lost. Those who breed faster will replace the rest. In the absence of breeding control a policy of one mouth and one meal ultimately produces one totally miserable world. In a less than perfect world the allocation of rights based on territory can be defended if a ruinous breeding race is to be avoided. It is unlikely that civilization and dignity can survive everywhere, but better in a few places than in none. Fortunate minorities must act as the trustees of a civilization that is threatened by uniform good intentions. Parts of the world are unable to support their population. If we do not do anything about the problem we will all go down. We have to let those that are unable to support themselves go under so that the rest can survive."(3) There is even a proposal to deliberately withhold food from starving countries because that is the quickest way to see that the population is controlled.

There is another approach to the limitation of population which is really quite different from all of the preceding ones, one which I personally think is supported most effectively by what we know today. Before I describe it I would like to make a few general statements about the relationship between the population problem and biology. To study the population of an insect is a biological problem; the characteristics of the growth of this particular population are wholly understood by understanding the biological factors. Populations of human beings cannot be described solely by biological factors. For example, the population of France for two centuries remained absolutely in balance. This was in the 1800s, long before modern contraceptive techniques. It may be assumed that this balance indicates the population did not have enough food for everyone, and so the resulting death rate balanced the birth rate. That assumption is false. The population of France was ultimately balanced because of the civil laws of inheritance. The laws of inheritance were such that if there were too many sons in the family the land holdings would be split, and the family would lose its ability

to run an agricultural operation. The French understood this and therefore limited their families.

Another example of how population is influenced by the social and political climate is the Soviet Union and Romania, where the need for a growing population depends on political outlook.

So then, the science of human population is not a biological science, but rather a social science. What people privately think is a matter of sociology or politics; it is not a matter of biology. Now obviously biology is involved, but the governing factors that manipulate the changes in birth rate and death rate should be of our interest. These factors are largely in the realm of society. I would like now to consider what social science, and particularly demography, has to tell us about the science of human populations.

There is a very good book by E.A. Wrigley--Population and History--which summarizes what demographers now know. Demographers have delineated a very complex network of factors that influence birth rate and death rate and therefore the rate of growth of a population. I will state them briefly.

Population is increased if the birth rate goes up and decreased if the death rate goes up. In one sense population is obviously under the influence of birth rate and death rate, but there is a circular loop in this phenomenon. The question of a couple's motivation for a certain number of children is an important influence on the birth rate. For example, sociological studies have determined that many people desire to have sons so that they will have someone to look after them when they become older. If a son should die in infancy, the parents are usually stimulated to have more children in an effort to replace that son. The next child may be a daughter, and so the couple will continue to have more children than they really want until they have a son. This is the aspect of the death rate that does not reduce the population--it increases it. A high infant mortality always results in an increased motivation to have children.

When the population rises it is possible to elevate the economic activity of a country and to have a division of labor. When this happens educational opportunities increase; young people stay in school longer than they otherwise would. When young women and young men stay in school (but the most important effect is on women), their age at marriage rises. They tend not to marry as early and that is the most powerful factor in limiting the birth rate. The Chinese limited their birth rate in recent years by enormous propaganda to have young people delay three years in their age at marriage and three years in the birth of their children. This limits the birth rate quickly. So here is an increase in the population which generates a lower birth rate instead of a higher birth rate, through the mechanism of economic activity, more education and a delay in the age of marriage. It is absolutely false to regard the growth of a population of human beings as being simply the resultant of birth rate and death rate.

An analysis of these factors reveals an interesting process which apparently has governed the growth of the populations of all developed countries that we know of in Europe. To use England as an example, the population in England was constant before 1600. It had a high birth rate and a high death rate and the two were balanced. Beginning around the time of the industrial and agricultural revolution the population started rising, and in the 1800s went into an exponential rise. The result was a population explosion. I do not know what the condition is in England now, but I suspect it is somewhat like our own in that the rate of growth of population has leveled off. The statistical curve created is an S-shape curve. Demographers understand the forces which gave rise to the shape of that curve, and I will attempt to explain them.

First, why is it that the population starts growing? Research indicates that the time in a country's history when the growth rate rapidly starts to increase is the time in which the standard of living begins to rise. Using England again as an example, as a result of the industrial and agricultural revolution the production of goods per capita--food, clothing, housing, fuel--increased. When the per capita production began to rise, people had more to eat and better ways of keeping warm in the winter, and so the death rate rapidly began to decline. The death rate declined but the birth rate remained constant. As that happened the gap between the two grew bigger and a rapid rise in the population resulted. This occurrence has taken

place in every European country. It is a fact that a rise in the standard of living allows people to live longer; in particular, children do not die as often in infancy. The death rate drops but the birth rate remains constant since people have accepted a given level of fertility. As a result, the population starts rising.

An examination of data reveals that after 30 or 50 years the birth rate begins to decline. This prevents the growing gap between birth and death rates from becoming larger; the growth of the population is slowed down. As the death rate continues to fall there comes a point in which the birth rate begins to drop very sharply.

Using the example of England again, at the time of the agricultural and industrial revolution the English people were accustomed to having everyone in the family, including the children, work. The limited resources were such that children had to work. It was necessary for families to be large because that was the only way in which people could support themselves. As more children continued to live couples began to limit their family size. A child working in a mine or factory is an economic asset; a child sent to school is an economic liability. When the economic circumstances change, when children no longer must work but can go to school, families become smaller.

At the same time, with the rising standard of living in society, people can expect the state to provide for their old age. In Sweden, for example, as social services increased the population began to decline. The economic value of a large family is therefore lessened. The rising standard of living first accelerates the growth of the population and as it continues to rise the population slows down and levels off. This is known as the demographic transition.

Let us consider now the demographic transition as it relates to developing countries. All countries are going through the transition, but some have not arrived at the last phase. There is a fact concerning developing countries which is seldom mentioned, and that is they are all former colonies. A connection exists between the facts that these countries were colonies and their populations are rising rapidly.

When the Dutch colonized Indonesia they brought in doctors, road builders, various technicians, agriculturists, and the standard of living in the Indonesian population began to rise. What was previously a balanced population with a high death rate and a high birth rate went through the first step of the demographic transition--the death rate dropped and the birth rate remained high. This is a natural phenomenon. The standard of living began to improve and the death rate responded immediately. However, the second stage of the demographic transition which is the consequence of continued rise in the standard of living did not appear. The wealth created by the new agriculture was not kept in Indonesia but went to Holland where it helped the Dutch to go through the second stage of their demographic transition. The lack of money naturally prevented the Indonesian population from continuing to have an elevated standard of living. This was a kind of demographic parasitism, in which the second stage of the demographic transition for the Dutch was being fed by the suppression of it in the colonies. The growth of a high standard of living in Western Europe and with it the stabilization of those populations was achieved at the expense of the exploitation, not only of the resources of the colonies, but of their populations.

The Dutch enacted laws in Indonesia that required taxes to be paid in human labor; the birth rate therefore was encouraged. Medical advances served the purpose of keeping the people alive in order to have an adequate labor force. So the intervention by one human society into another literally brought about a population explosion in that other country.

It is very important that we in this country understand this because I assure you that this history is thoroughly understood by people in the developing countries. They look to us as being the cause of the problem they face in the gap between their population and their resources. We not only took possession of their resources but we imposed upon them a rising population. As the demographer Nathan Keyfitz, from Berkeley, has said, "The ultimate result of colonialism is a one billion excess in the world's population." The facts which demographers know about the pattern of growth of populations, both in developed countries and developing countries, illustrate this concept. The continued rise of the standard of living gives rise first to a population explosion and then to a leveling off. In some countries it has leveled off and in others it is still rising.

One of the critical elements in the determining factors of population growth is the infant mortality.

Whenever the infant mortality has fallen to minimum value, about 10 or 20 per thousand live births in the first year of life, there is a very sharp drop in the birth rate. The response of the birth rate to the death rate is not linear. As the death rate and particularly infant mortality approaches a minimum level, the birth rate in every country, not only in western ones, drops precipitously. The demographic transition explains this phenomenon.

There has been an interesting field study conducted in 1954 by a group from Harvard on the efficacy of family planning. The intention of the study was an attempt to decrease the birth rate in several Indian villages by means of an education program which would instruct people on the use of contraceptives. In 1969 the experiment ended, and its statistics indicated that it had failed. The experimental villages had exactly the same birth rate in 1969 as the control villages.

More recently a Harvard graduate student, Mamo Mandani, attempted to understand why the experiment had failed. His findings were made into a book, The Myth of Population Control, published by Monthly Review Press, New York. Mandani's first interest was a test village in which, the Harvard report said, the people had accepted and used the contraceptives, but without an accompanying decline in birth rate. One such acceptance case was a sometime land laborer who is now a watchman at the village high school. Mandani writes in his book, "I questioned him as to whether he used the tablets or not. 'Certainly,' he said, 'you can read it in the records; from 1957 to 1960 I never failed.' This man, though, had had a son, born sometime in late 1958 or 1959. At our third meeting I pointed this out to him. Finally he looked at me and responded, 'Someday you will understand--it is sometimes better to lie. It stops you from hurting people, does no harm, and might even help.' The next day he took me to another house and I saw small rectangular boxes, one piled on top of the other, all arranged in a tiny sculpture in the corner of the room. My friend said, 'Most of us have thrown the tablets away, but my brother makes use of everything.'"

There have been such stories before and they have been considered as nothing more than evidence of the brutal ignorance of these peasants. But Mandani sought to understand why the people refused to utilize the tablets. He interviewed several people and began to discover a really marvelously telling fact. I would like to read another section from the book, but first I want to reiterate that this is India, which is in the process of trying to develop itself, of trying to create

new educational opportunities and raise its standard of living. I will now quote the following account from Mandani: "To begin with, most families have either little or no savings and they can earn too little to be able to finance the education of any children, even through high school. High school is there but they cannot send their children to it because they do not have the resources. Another source of income must be found. The only solution as one man told me is, "to have enough children so that there are at least three or four sons in the family.' Why? Because then each son can finish high school by spending part of the afternoon working after school. One son is sent on to college while the other sons save and pay the necessary fees. Once his education is complete he will use his increased earnings to put his brother through college. He will not marry until the second brother has finished his college education and can carry the burden of educating the third brother." This procedure was their method of educating the family.

The study pointed out that it was the rise in the age of marriage from 17.5 years in 1956 to 20 years in 1969, and not the birth control program, that was responsible for a decrease in the birth rate. I should mention that both the control and test villages had a decrease in the birth rate of the same magnitude. The birth rate dropped from 40 per thousand in 1957 to 35 per thousand in 1968 because the age of marriage was higher, brought about by the particular scheme of educating the family and raising the standard of living. So Mandani concludes, "While the birth control program was a failure, the net result of the technological and sociological change in Manipur was a decrease in the birth rate." This is an explicit example of the demographic transition in operation in India. This method will bring about a decline in the birth rate more predictably than will biological control, through means of contraception.

This point can be argued. Other instances can be found in Latin America in which the demographic transition does not work this way, but the evidence is such that generally people will themselves limit their population as their standard of living improves. At this time this is the only effective way of controlling population, other than coercion.

The natural process of the demographic transition is slow; there is an argument that steps must be taken to force those nations that have a high birth rate to reduce their fertility, even when they do not want to. In cases in which there is currently a great overpopulation, the lifeboat ethic dictates

that all support should be withdrawn.

So then, there is a relationship between the standard of living and the birth rate--those countries with a high standard of living have a low birth rate. The relationship, however, is not linear.

It is important to consider the relationship between the birth rate and the GNP per capita. GNP per capita is not a particularly good index but it is the best one available for the standard of living. The U.S. GNP is about $4500 per capita; India's is about $88. The mean point is about $900 per capita, at which level Greece is. The birth rate in Greece is about twenty per thousand; the birth rate in the U.S. is about eighteen. If $3500 were to be added to Greece's per capita, there would not be a great reduction in birth rate. But if only one thousand dollars were added to the GNP of the developing countries, the transition point would be reached and the birth rate will drop. The argument that the U.S. cannot give other countries the resources it has is not applicable. It is not necessary for that to be done.

Our standard of living is enormously inflated from waste. For example, trucks are used instead of the railroads to transport fuel, but trucks burn four to five times as much fuel as it costs to carry it. When the waste is taken out of our standard of living the discrepancy becomes even greater. It would take a relatively small redistribution of wealth to bring all of the developing countries to the point where the demographic process would bring the birth rate down to a reasonable position. The telling figure is the world average per capita, which is around $880. Such a figure would indicate a birth rate of a little over twenty per thousand, but the actual average birth rate in the world is thirty-four. It follows that if the GNP of the world were evenly distributed, every country would have a great enough GNP to achieve a birth rate of about twenty-two. The birth rate is at thirty-four because the world's wealth is not evenly distributed. There are very rich countries and exceedingly poor ones. If the low GNP levels of the very poor countries could be brought up to the level of Greece, all countries would have a relatively low birth rate. There is an argument that this cannot be done because there are not enough resources available, particularly food.

Regarding the matter of food production, another case history from India will illustrate the problem. Roger Revelle (4), from Harvard, has reported his findings from an analysis done on the state of Madras in 1967. About one-third of the population was starving;

they were below the physiologically adequate intake of protein and calories. But when the total food intake was averaged--the total food available in the state of Madras compared to the total population--it was found that there was enough food to meet 99% of the calorie and protein requirements. In actuality a third of the population has only 80% of its calorie and protein requirements met. The reason some people in the state of Madras were below the physiological standard was that some people were above it. Again, the problem centers on the matter of redistribution.

A direct figure is available for the world production of food per person. If all of the food available in the world were divided equally among the population, every person would have twice the physiological requirements for calories and protein. The argument is that since the population is increasing and food production cannot increase at the same level, what will be the ratio ten years from now? Recently the University of California published a report by its Division of Agricultural Sciences, Food Task Force (5). This report provides an estimate of what the relationship between the supply and demand of food will be like in 1985. It was found that the overall world availability of protein and calories would be sufficient to meet the demand of the expected population. There would be excesses in North America and in certain parts of Europe, a deficiency in England in its own food production and a deficiency in Asia. But the deficiencies could be eliminated by redistribution. I would like to quote one very simple conclusion that they have reached--"Projected regional shortages have vastly different implications for areas which can afford to buy on the world market and areas which cannot. Europe, particularly England, is expected to make up its deficit by importing food abroad, while countries that cannot afford to import food, for example, those in Asia, will suffer from malnutrition ... Despite the overall world balance between supply and demand, given the limited buying power of many consumers in the less developed nations, the world food dilemma will continue--malnutrition and starvation in some areas while food surpluses accumulate in other regions."

Both today and in 1985 the reason for starvation in the world would be the mal-distribution of food. In considering any one of the current famines it becomes apparent that the chief cause is the failure to deliver food, sometimes for ridiculous reasons. For example, the hunger in Ethiopia turned to widespread famine because the graft-ridden Ethiopian officials did not report the situation to the government early enough, and when food supplies were eventually sent in they were diverted to the purposes of the officials.

There was an interesting article in the New York Times Magazine on the famine in Sahel. Although food was being shipped into Sahel there was still famine. The newspaper article carried a timetable on the rate of food delivery to the port and the rate of transport overland. The food had to be delivered to the port at an exact time so that the trucks which would transport it overland would be waiting when it arrived. Unfortunately, the procedure was not well run. Food accumulated at the port because it came in at the wrong time, and the result was that the amount of food delivered in Sahel was of a smaller lot than the amount of actual food that was available. The critical governing factor then is not the ability to produce food but the distribution of the food. One answer to the problem is to leave the distribution as deficient as it is and simply expect the hungry countries to produce more food.

It is particularly ironic that the overall world production of food could actually be increased if the present grossly disparate availability of the necessary inputs, fertilizer in particular, were even slightly redistributed. The fertilizer problem is an illuminating example. In general, crop yield per unit of applied fertilizer diminishes with increasing rates of fertilizer application. For example, in India between 1958 and 1963, average yield increased from about 720 to 820 kg/ha, while fertilizer use increased from about 1.3 to 2.7 kg/ha. The incremental resource productivity of fertilizer--i.e., the efficiency with which fertilizer is converted into food--is therefore 100 kg of crop/1.4 kg of fertilizer, or a ratio of 71. In Japan during the same period, yield increased from 4,500 to 5,400 kg/ha while fertilizer application increased from 200 to 260 kg/ha; the resource productivity ratio is 900/60 or 15. In the U.S., between 1958 and 1963, average yields increased from about 2,005 to 2,500 kg/ha with fertilizer use increasing from about 30 to 43 kg/ha. The incremental resource productivity of fertilizer in the U.S. was therefore 495 kg of crop/13 kg of fertilizer, or a ratio of 38. Thus, in that period of time the effectiveness of a given increment in fertilizer use in producing crops in India was almost twice as much as it was in the U.S., and almost five times as much as it was in Japan. If we are interested in using fertilizer to increase world food production it should be remembered that fertilizer can yield greater results in India than it can in the U.S. or Japan. It should also be kept in mind, of course, that other necessary inputs, such as appropriate crop varieties, must be available.

There is a current deficit of about 200,000 tons of nitrogen fertilizer in rice production in Asia. Based on a general estimate that nitrogen fertilizer applied to rice produces about 15 times its weight in added crop, this deficit means a loss of about three million

tons of rice. Now consider a typical situation in a developed country--for example, the use of nitrogen fertilizer to produce corn in Illinois. A detailed study was conducted on Illinois farms by the Center for the Biology of Natural Systems. In 1971, Illinois used about 680,000 tons of nitrogen fertilizer to produce about 30 million tons of corn; the average rate of application was 130 pounds per acre. If the total use of the fertilizer were reduced by 200,000 tons, the average rate of application would fall to 92 pounds per acre. In turn this would reduce the average yield of corn by about 6.8 percent, so that the total amount of crop lost would be about two million tons. Thus if 200,000 tons of the fertilizer were shifted from Illinois to Asia, total world grain production could be increased by some one million tons. These figures, approximate as they are, indicate that in this specific instance the efficiency with which fertilizer is converted to grain--the resource productivity--is about 50 percent higher in Asia than it is in Illinois. This is only one example of a basic fact about the efficiencies with which major resources are transformed into useful goods in developing countries and in technologically advanced ones.

I have already pointed out that we can regard the rapid growth of population in developing countries and the grinding poverty which engenders it as the distant outcome of colonial exploitation--a policy having been imposed on the antecedents of the developing countries by the more advanced ones. This policy has forcefully determined both the distribution of the world's wealth and of its different populations, accumulating most of the wealth in the western countries and most of the people in the remaining, largely tropical, ones.

Thus there is a grave imbalance between the world's wealth and the world's people. But the imbalance is not the supposed disparity between the world's total wealth and total population. Rather, it is due to the gross distributive imbalance among the nations of the world. What the problem calls for, I believe, is a process that has already begun to figure in the thinking peoples of the Third World: a return of some of the world's wealth to the countries whose resources and peoples have borne so much of the burden of producing it--the developing nations.

There is no denying that this proposal would involve exceedingly difficult economic, social and political problems, especially for the rich countries. But the alternative solutions that have been advanced are at least as difficult and socially stressful.

A major source of confusion is that these diverse

proposed solutions to the population problem, which differ so sharply in their moral postulates and their political effects, appear to have a common base in scientific fact. It is, after all, equally true, scientifically, that the birth rate can be reduced by promulgating contraceptive practices (providing they are used), by elevating living standards, or by withholding food from starving nations.

What is particularly disturbing is that behind this screen of confusion between scientific fact and political intent there has developed an escalating series of what can only be regarded, in my opinion, as inhumane, abhorrent political schemes put forward in the guise of science. First there appeared Paddock's triage proposal, which would condemn whole nations to death through some species of global "benign neglect". Then there have been schemes for coercing people to curtail their fertility, by physical and legal means which are ominously left unspecified. Now there is an argument that we must curtail rather than extend our efforts to feed the hungry peoples of the world. Is it conceivable that the proponents of coercive population control will be guided by one of Garrett Hardin's earlier, astonishing proposals:

> "How can we help a foreign country to escape over-population? Clearly the worst thing we can do is send food ... atomic bombs would be kinder. For a few moments the misery would be acute, but it would soon come to an end for most of the people, leaving a very few survivors to suffer thereafter". ("The Immorality of Being Softhearted", Stanford Alumni Almanac, Jan. 1969).

There has been a long-standing alliance between pseudoscience and political repression; this evil alliance feeds on confusion.

The present confusion can be removed by recognizing all of the current population proposals for what they are--not scientific observations but value judgments that reflect sharply differing ethical views and political intentions. The family planning approach, if applied as the exclusive solution to the problem, would put the burden of remedying a fault created by a social and political evil--colonialism--voluntarily on the individual victims of the evil. The so-called "lifeboat ethic" would compound the original evil of colonialism by forcing its victims to forego the humane course toward a balanced population and the improvement of living

standards, or if they refuse, to abandon them to destruction, or even to thrust them toward it.

My own purely personal conclusion is, like all of these, not scientific but political: that the world population crisis, which is the ultimate outcome of the exploitation of poor nations by rich ones, ought to be remedied by returning to the poor countries enough of the wealth taken from them to give their peoples both the reason and the resources voluntarily to limit their own fertility.

In sum, I believe that if the root cause of the world population crisis is poverty, then to end it we must abolish poverty. And if the cause of poverty is the grossly unequal distribution of the world's wealth, then to end poverty and with it the population crisis, we must redistribute that wealth, among nations and within them.

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